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The American Annual of Photography

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FOR 1891

EDITED BY

C. W. CANFIELD

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P	R	E	F	A	C	E
E	*I*	*A*	*I*	*N*	*A*	*E*
T	*C*	*T*	*S*	*D*	*T*	*L*
E	*E*	*S*	*H*		*C*	*S*
R					*H*	
					E	
					S	

In youthful days, such was the acrostic strung on the letters of this familiar word, and idly repeated by the schoolboy mind and lips, "creeping like snail, unwillingly," toward the appointed lesson, and gladly welcoming this slender excuse for lingering yet a moment ere application should begin in good earnest.

To Rice's identity there was no clue; he was a brilliant generalization, simply. Where, when, or how he lived—none could say. Yet it is evident that he dwelt nigh the living streams or great waters, and that he obtained from thence and used that finny food which at once nourishes the body and stimulates the mind. It is also shown by his brief biography, that he exercised a choice; while he ate undoubted fish, he contented himself with merely catching those wriggling inhabitants of the depths, whose very name suggests a squirm. Perhaps he sold them.

The Morality.

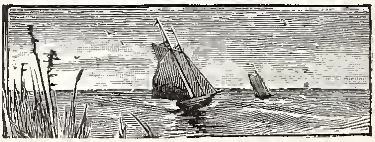
This fable teacheth, O Photographic Public, that thy name is Peter Rice; that thou shouldst draw from the streams of knowledge and experience and progress, flowing in ever-deepening flow past thy

very doors, fit food, that shall not merely broaden thy hold on photographic existence, but stimulate photographic imagination and its artistic sisterhood; rejecting that which suiteth not thy palate.

Here, then, we serve with pictures as dainty garnishings, decoying the eye, and whetting the appetite, such food, our annual dish, the materials for which have come from far and wide, as for a feast of Lucullus.

Take, O Peter Rice, photographer, eat and be satisfied, not forgetting to return thanks, with us, to all those whose bent pins, or wide-reaching seines or mighty drag-nets have ensnared and given up their various prey for this year of grace, 1891.

C W Canfield



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Neg. by A. R. Dresser. Kurtz Process.

"CLIMBING PLANT."

REFERENCE CALENDAR FOR THREE YEARS.

1890

	S	M	T	W	T	F	S		S	M	T	W	T	F	S		S	M	T	W	T	F	S
Jan.	..	..	..	1	2	3	4	May	..	..	..	..	1	2	3	Sept.	..	1	2	3	4	5	6
	5	6	7	8	9	10	11		4	5	6	7	8	9	10		7	8	9	10	11	12	13
	12	13	14	15	16	17	18		11	12	13	14	15	16	17		14	15	16	17	18	19	20
	19	20	21	22	23	24	25		18	19	20	21	22	23	24		21	22	23	24	25	26	27
	26	27	28	29	30	31	..		25	26	27	28	29	30	31		28	29	30	..	..	..	..
Feb.	..	..	..	..	..	..	1	June	1	2	3	4	5	6	7	Oct.	..	..	..	1	2	3	4
	2	3	4	5	6	7	8		8	9	10	11	12	13	14		5	6	7	8	9	10	11
	9	10	11	12	13	14	15		15	16	17	18	19	20	21		12	13	14	15	16	17	18
	16	17	18	19	20	21	22		22	23	24	25	26	27	28		19	20	21	22	23	24	25
	23	24	25	26	27	28	..		29	30	..	..	..	..	..		26	27	28	29	30	31	.
Mar.	..	..	..	..	..	..	1	July	..	..	1	2	3	4	5	Nov.	..	..	..	..	..	..	1
	2	3	4	5	6	7	8		6	7	8	9	10	11	12		2	3	4	5	6	7	8
	9	10	11	12	13	14	15		13	14	15	16	17	18	19		9	10	11	12	13	14	15
	16	17	18	19	20	21	22		20	21	22	23	24	25	26		16	17	18	19	20	21	22
	23	24	25	26	27	28	29		27	28	29	30	31	..	..		23	24	25	26	27	28	29
	30	31	..	..	..	..	..	Aug.	..	..	..	..	..	1	2		30	..	..	..	..	..	..
April	..	..	1	2	3	4	5		3	4	5	6	7	8	9	Dec.	..	1	2	3	4	5	6
	6	7	8	9	10	11	12		10	11	12	13	14	15	16		7	8	9	10	11	12	13
	13	14	15	16	17	18	19		17	18	19	20	21	22	23		14	15	16	17	18	19	20
	20	21	22	23	24	25	26		24	25	26	27	28	29	30		21	22	23	24	25	26	27
	27	28	29	30	..	..	..		31	..	..	..	..	..	..		28	29	30	31	..	..	..

1891

	S	M	T	W	T	F	S		S	M	T	W	T	F	S		S	M	T	W	T	F	S
Jan.	..	..	..	..	1	2	3	May	..	..	..	..	..	1	2	Sept.	..	..	1	2	3	4	5
	4	5	6	7	8	9	10		3	4	5	6	7	8	9		6	7	8	9	10	11	12
	11	12	13	14	15	16	17		10	11	12	13	14	15	16		13	14	15	16	17	18	19
	18	19	20	21	22	23	24		17	18	19	20	21	22	23		20	21	22	23	24	25	26
	25	26	27	28	29	30	31		24	25	26	27	28	29	30		27	28	29	30	..	..	..
	..	..	..	..	..	..	..		31	..	..	..	..	..	..	Oct.	..	..	..	..	1	2	3
Feb.	1	2	3	4	5	6	7	June	..	1	2	3	4	5	6		4	5	6	7	8	9	10
	8	9	10	11	12	13	14		7	8	9	10	11	12	13		11	12	13	14	15	16	17
	15	16	17	18	19	20	21		14	15	16	17	18	19	20		18	19	20	21	22	23	24
	22	23	24	25	26	27	28		21	22	23	24	25	26	27		25	26	27	28	29	30	31
	..	..	..	..	..	..	..		28	29	30	..	..	..	..		..	..	..	..	..	..	..
Mar.	1	2	3	4	5	6	7	July	..	..	..	1	2	3	4	Nov.	1	2	3	4	5	6	7
	8	9	10	11	12	13	14		5	6	7	8	9	10	11		8	9	10	11	12	13	14
	15	16	17	18	19	20	21		12	13	14	15	16	17	18		15	16	17	18	19	20	21
	22	23	24	25	26	27	28		19	20	21	22	23	24	25		22	23	24	25	26	27	28
	29	30	31	..	..	..	..		26	27	28	29	30	31	..		29	30	..	..	..	..	..
April	..	..	..	1	2	3	4	Aug.	..	..	..	..	..	..	1	Dec.	..	..	1	2	3	4	5
	5	6	7	8	9	10	11		2	3	4	5	6	7	8		6	7	8	9	10	11	12
	12	13	14	15	16	17	18		9	10	11	12	13	14	15		13	14	15	16	17	18	19
	19	20	21	22	23	24	25		16	17	18	19	20	21	22		20	21	22	23	24	25	26
	26	27	28	29	30	..	..		23	24	25	26	27	28	29		27	28	29	30	31	..	..
	..	..	..	..	..	..	..		30	31	..	..	..	..	..		..	..	..	..	..	..	..

1892

	S	M	T	W	T	F	S		S	M	T	W	T	F	S		S	M	T	W	T	F	S
Jan.	..	..	..	..	..	1	2	May	1	2	3	4	5	6	7	Sept.	..	..	..	..	1	2	3
	3	4	5	6	7	8	9		8	9	10	11	12	13	14		4	5	6	7	8	9	10
	10	11	12	13	14	15	16		15	16	17	18	19	20	21		11	12	13	14	15	16	17
	17	18	19	20	21	22	23		22	23	24	25	26	27	28		18	19	20	21	22	23	24
	24	25	26	27	28	29	30		29	30	31	..	..	..	..		25	26	27	28	29	30	..
	31	..	..	..	..	..	..	June	..	..	..	1	2	3	4	Oct.	..	..	..	..	..	..	1
Feb.	..	1	2	3	4	5	6		5	6	7	8	9	10	11		2	3	4	5	6	7	8
	7	8	9	10	11	12	13		12	13	14	15	16	17	18		9	10	11	12	13	14	15
	14	15	16	17	18	19	20		19	20	21	22	23	24	25		16	17	18	19	20	21	22
	21	22	23	24	25	26	27		26	27	28	29	30	..	..		23	24	25	26	27	28	29
	28	29	..	..	..	..	..	July	..	..	..	..	..	1	2		30	31	..	..	..	..	..
Mar.	..	..	1	2	3	4	5		3	4	5	6	7	8	9	Nov.	..	..	1	2	3	4	5
	6	7	8	9	10	11	12		10	11	12	13	14	15	16		6	7	8	9	10	11	12
	13	14	15	16	17	18	19		17	18	19	20	21	22	23		13	14	15	16	17	18	19
	20	21	22	23	24	25	26		24	25	26	27	28	29	30		20	21	22	23	24	25	26
	27	28	29	30	31	..	..		31	..	..	..	..	..	..		27	28	29	30	..	..	..
April	..	..	..	..	..	1	2	Aug.	..	1	2	3	4	5	6	Dec.	..	..	..	..	1	2	3
	3	4	5	6	7	8	9		7	8	9	10	11	12	13		4	5	6	7	8	9	10
	10	11	12	13	14	15	16		14	15	16	17	18	19	20		11	12	13	14	15	16	17
	17	18	19	20	21	22	23		21	22	23	24	25	26	27		18	19	20	21	22	23	24
	24	25	26	27	28	29	30		28	29	30	31	..	..	..		25	26	27	28	29	30	31

CENTURY CALENDAR.

For explanation see opposite page.

Table 1. Years 1800-1901.

For economy of space, the century prefixes "18" and "19" have been omitted.

00	01	02	03	**04**	04	05
06	07	**08**	08	09	10	11
12	12	13	14	15	**16**	16
17	18	19	**20**	20	21	22
23	**24**	24	25	26	27	**28**
28	29	30	31	**32**	32	33
34	35	**36**	36	37	38	39
40	40	41	42	43	**44**	44
45	46	47	**48**	48	49	50
51	**52**	52	53	54	55	**56**
56	57	58	59	**60**	60	61
62	63	**64**	64	65	66	67
68	68	69	70	71	**72**	72
73	74	75	**76**	76	77	78
79	**80**	80	81	82	83	**84**
84	85	86	87	**88**	88	89
90	91	**92**	92	93	94	95
96	96	97	98	99	00	01

Table 2. 1st day of Month.

Jan	W	Th	F	S	𝔖	M	Tu
Feb	S	𝔖	M	Tu	W	Th	F
Mar	S	𝔖	M	Tu	W	Th	F
Apl	Tu	W	Th	F	S	𝔖	M
May	Th	F	S	𝔖	M	Tu	W
June	𝔖	M	Tu	W	Th	F	S
July	Tu	W	Th	F	S	𝔖	M
Aug	F	S	𝔖	M	Tu	W	Th
Sep	M	Tu	W	Th	F	S	𝔖
Oct	W	Th	F	S	𝔖	M	Tu
Nov	S	𝔖	M	Tu	W	Th	F
Dec	M	Tu	W	Th	F	S	𝔖

Table 3. Days of Month.

1	𝔖	M	Tu	W	Th	F	S	1
2	M	Tu	W	Th	F	S	𝔖	2
3	Tu	W	Th	F	S	𝔖	M	3
4	W	Th	F	S	𝔖	M	Tu	4
5	Th	F	S	𝔖	M	Tu	W	5
6	F	S	𝔖	M	Tu	W	Th	6
7	S	𝔖	M	Tu	W	Th	F	7
8	𝔖	M	Tu	W	Th	F	S	8
9	M	Tu	W	Th	F	S	𝔖	9
10	Tu	W	Th	F	S	𝔖	M	10
11	W	Th	F	S	𝔖	M	Tu	11
12	Th	F	S	𝔖	M	Tu	W	12
13	F	S	𝔖	M	Tu	W	Th	13
14	S	𝔖	M	Tu	W	Th	F	14
15	𝔖	M	Tu	W	Th	F	S	15
16	M	Tu	W	Th	F	S	𝔖	16
17	Tu	W	Th	F	S	𝔖	M	17
18	W	Th	F	S	𝔖	M	Tu	18
19	Th	F	S	𝔖	M	Tu	W	19
20	F	S	𝔖	M	Tu	W	Th	20
21	S	𝔖	M	Tu	W	Th	F	21
22	𝔖	M	Tu	W	Th	F	S	22
23	M	Tu	W	Th	F	S	𝔖	23
24	Tu	W	Th	F	S	𝔖	M	24
25	W	Th	F	S	𝔖	M	Tu	25
26	Th	F	S	𝔖	M	Tu	W	26
27	F	S	𝔖	M	Tu	W	Th	27
28	S	𝔖	M	Tu	W	Th	F	28
29	𝔖	M	Tu	W	Th	F	S	29
30	M	Tu	W	Th	F	S	𝔖	30
31	Tu	W	Th	F	S	𝔖	M	31

EXPLANATION OF CENTURY CALENDAR.

(See opposite page).

To ascertain the day of the week corresponding to any date from the 1st January, 1800, to the 31st of December, 1901, both inclusive; find the given year in Table 1, and follow downward the vertical column containing it, until reaching, in Table 2, the horizontal line beginning with the given month; at the intersection of the column and line, will be found the day of the week with which the month commences. In Table 3, find the vertical column beginning with that day of the week, and follow it downward until reaching the horizontal line beginning with the given day of the month; at the intersection of the column and line will be found the day of the week corresponding to the given year, month and day.

NOTE.—Leap-years will be found entered twice in Table 1; first in heavy-faced type; and afterward in ordinary characters. The first entry is to be used when the given date is in January or February of the given year; the second, (ordinary type), when falling in any other month.

EXAMPLES.—Given the 29th of February, 1824:—To find the day of the week on which it fell. Under the first entry of 24, in Table 1, and opposite Feb., in Table 2, is found Sunday. Under Sunday in Table 3, and opposite 29, is found Sunday, which is the required day of the week. Given the 22d of December, 1864:—Under the second entry of 64, in Table 1, and opposite Dec., in Table 2, is found Th. In Table 3, under Th., and opposite 22, is found Th., which is the required day of the week. Given the 12th of September, 1855:—Under 55, in Table 1, and opposite Sept., in Table 2, is found S. In Table 3, under S and opposite 12, is found W., which is the required day of the week.

ECLIPSES IN 1891.

NOTE.—*Local mean time for the latitude of New York City is used in reckoning eclipses, sunset and sunrise. Subtract four minutes to change the reckoning to Eastern standard time of 75th meridian.*

Moons phases are calculated for Eastern standard time. "Morn." is understood to extend from Midnight to Noon; "Eve." from Noon to Midnight.

There will be four eclipses in 1891.

I.—*A total eclipse of the Moon*, May 23, invisible at Washington.

II.—*An annular eclipse of the Sun*, June 6, invisible at Washington.

III.—*A total eclipse of the Moon*, November 15, visible at Washington, and generally over the world. Moon enters penumbra, 5.39 p.m. Totality begins, 6.41 p.m.: ends, 8.04. Moon leaves penumbra, 9.06 p.m.

IV.—*A partial eclipse of the Sun*, November 30-December 1, invisible at Washington.

A transit of Mercury over the Sun's disk, May 9, partly visible at Washington, and visible throughout the western portion of North America.

THE SEASONS.

SPRING begins...........March 20, 4 p.m.	AUTUMN begins . . .September 23, 3 a.m.
SUMMER begins.............June 21, 12 m.	WINTER begins ......December 22, 2 a.m.

CHURCH DAYS.

Septuagesima. ......Jan. 25	Easter Sunday....March 29
Sexagesima..........Feb. 1	Rogation Sunday....May 3
Quinquagesima ......Feb. 8	Ascension Day.......May 7
Ash Wednesday....Feb. 11	Whitsunday.........May 17
Quadragesima .....Feb. 15	Trinity Sunday.....May 24
Palm Sunday.....March 22	Corpus Christi .....May 28
Good Friday .....March 27	Advent Sunday.....Nov. 29

CHRONOLOGICAL CYCLES.

Dominical Letter	D
Epact	20
Golden Number (Lunar Cycle)	11
Solar Cycle	24
Roman Indiction	4

CHRONOLOGICAL ERAS.

The year 1891, which comprises the latter part of the 115th and the beginning of the 116th year of the INDEPENDENCE OF THE UNITED STATES OF AMERICA, corresponds to the year 6604 of the JULIAN PERIOD; the years 7399-7400 of the BYZANTINE ERA; the years 5651-52 of the JEWISH ERA; the year 2644 since the FOUNDATION OF ROME, according to Varro; the year 2667 of the OLYMPIADS; the year 1607 of the era of DIOCLETIAN; the year 2551 of the JAPANESE ERA; the years 1808-9 of the MOHAMMEDAN ERA.

The 1st day of January of the year 1891 is the 2,411,734th day since the commencement of the JULIAN PERIOD.

JANUARY, 1891.

1st MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
1	**1**	Th	7 25	4 43
2	**2**	F	7 25	4 44
3	**3**	Sa	7 25	4 45
4	**4**	S	7 25	4 46
5	**5**	M	7 25	4 47
6	**6**	Tu	7 25	4 48
7	**7**	W	7 25	4 49
8	**8**	Th	7 24	4 50
9	**9**	F	7 24	4 51
10	**10**	Sa	7 24	4 52
11	**11**	S	7 24	4 53
12	**12**	M	7 23	4 54
13	**13**	Tu	7 23	4 55
14	**14**	W	7 23	4 56
15	**15**	Th	7 22	4 57
16	**16**	F	7 22	4 59
17	**17**	Sa	7 21	5 00
18	**18**	S	7 21	5 01
19	**19**	M	7 21	5 02
20	**20**	Tu	7 20	5 03
21	**21**	W	7 19	5 04
22	**22**	Th	7 18	5 05
23	**23**	F	7 17	5 07
24	**24**	Sa	7 17	5 08
25	**25**	S	7 16	5 09
26	**26**	M	7 16	5 10
27	**27**	Tu	7 15	5 11
28	**28**	W	7 14	5 13
29	**29**	Th	7 13	5 14
30	**30**	F	7 12	5 15
31	**31**	S	7 12	5 16

Moon's Phases.

Last Q., Jan. 3, 5 h. 12 m., morn.
New M., Jan. 10, 10 h. 24 m., morn.
First Q., Jan. 17, 1 h. 17 m., morn.
Full M., Jan. 24, 7 h. 25 m., eve.

FEBRUARY, 1891.

2d MONTH. 28 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
32	**1**	S	7 11	5 18
33	**2**	M	7 10	5 19
34	**3**	Tu	7 09	5 20
35	**4**	W	7 07	5 21
36	**5**	Th	7 06	5 22
37	**6**	F	7 05	5 23
38	**7**	S	7 04	5 25
39	**8**	S	7 03	5 26
40	**9**	M	7 02	5 27
41	**10**	Tu	7 01	5 28
42	**11**	W	7 00	5 30
43	**12**	Th	6 58	5 31
44	**13**	F	6 57	5 32
45	**14**	S	6 56	5 34
46	**15**	S	6 55	5 35
47	**16**	M	6 53	5 36
48	**17**	Tu	6 52	5 37
49	**18**	W	6 51	5 39
50	**19**	Th	6 49	5 40
51	**20**	F	6 48	5 41
52	**21**	S	6 46	5 43
53	**22**	S	6 45	5 44
54	**23**	M	6 44	5 45
55	**24**	Tu	6 42	5 46
56	**25**	W	6 41	5 48
57	**26**	Th	6 39	5 49
58	**27**	F	6 38	5 50
59	**28**	S	6 37	5 51

Moon's Phases.

Last Q., Feb. 1, 11 h. 42 m., eve.
New M., Feb. 8, 9 h. 12 m., eve.
First Q., Feb. 15, 1 h. 29 m., eve.
Full M., Feb. 23, 2 h. 18 m., eve.

MARCH, 1891.

3d MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
60	**1**	$	6 35	5 53
61	**2**	M	6 34	5 53
62	**3**	Tu	6 32	5 54
63	**4**	W	6 30	5 55
64	**5**	Th	6 29	5 56
65	**6**	F	6 27	5 57
66	**7**	Sa	6 25	5 58
67	**8**	$	6 24	5 59
68	**9**	M	6 22	6 00
69	**10**	Tu	6 20	6 01
70	**11**	W	6 19	6 02
71	**12**	Th	6 17	6 03
72	**13**	F	6 16	6 04
73	**14**	Sa	6 14	6 05
74	**15**	$	6 12	6 06
75	**16**	M	6 11	6 08
76	**17**	Tu	6 09	6 09
77	**18**	W	6 07	6 10
78	**19**	Th	6 06	6 11
79	**20**	F	6 04	6 12
80	**21**	Sa	6 02	6 13
81	**22**	$	6 01	6 14
82	**23**	M	5 59	6 15
83	**24**	Tu	5 58	6 16
84	**25**	W	5 56	6 17
85	**26**	Th	5 54	6 18
86	**27**	F	5 52	6 19
87	**28**	Sa	5 51	6 20
88	**29**	$	5 49	6 21
89	**30**	M	5 47	6 22
90	**31**	Tu	5 45	6 23

Moon's Phases.

Last Q , March 3, 2 h. 37 m., eve.
New M., March 10, 6 h. 50 m., morn.
First Q., March 17, 4 h. 10 m., morn.
Full M., March 25, 8 h. 11 m., morn.

APRIL, 1891.

4th MONTH. 30 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
91	**1**	W	5 44	6 24
92	**2**	Th	5 42	6 26
93	**3**	F	5 41	6 27
94	**4**	Sa	5 39	6 28
95	**5**		5 37	6 29
96	**6**	M	5 36	6 30
97	**7**	Tu	5 34	6 31
98	**8**	W	5 33	6 32
99	**9**	Th	5 31	6 33
100	**10**	F	5 30	6 34
101	**11**	Sa	5 28	6 35
102	**12**	$	5 26	6 36
103	**13**	M	5 25	6 37
104	**14**	Tu	5 24	6 38
105	**15**	W	5 22	6 39
106	**16**	Th	5 20	6 40
107	**17**	F	5 19	6 41
108	**18**	Sa	5 17	6 42
109	**19**	$	5 16	6 43
110	**20**	M	5 11	6 44
111	**21**	Tu	5 13	6 45
112	**22**	W	5 11	6 46
113	**23**	Th	5 11	6 47
114	**24**	F	5 08	6 48
115	**25**	Sa	5 07	6 49
116	**26**	$	5 06	6 50
117	**27**	M	5 04	6 51
118	**28**	Tu	5 03	6 52
119	**29**	W	5 02	6 53
120	**30**	Th	5 00	6 55

Moon's Phases.

Last Q., April 2, 1 h. 30 m., morn.
New M., April 8, 3 h. 57 m., eve.
First Q., April 15, 8 h. 40 m., eve.
Full M., April 24, 0 h. 5 m., morn.

MAY, 1891.

5th MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
121	**1**	F	4 59	6 56
122	**2**	Sa	4 58	6 57
123	**3**	S	4 56	6 58
124	**4**	M	4 55	6 59
125	**5**	Tu	4 54	7 00
126	**6**	W	4 53	7 01
127	**7**	Th	4 52	7 02
128	**8**	F	4 51	7 03
129	**9**	Sa	4 49	7 04
130	**10**	S	4 48	7 05
131	**11**	M	4 47	7 06
132	**12**	Tu	4 46	7 07
133	**13**	W	4 45	7 08
134	**14**	Th	4 44	7 09
135	**15**	F	4 43	7 10
136	**16**	Sa	4 42	7 11
137	**17**	S	4 41	7 12
138	**18**	M	4 40	7 13
139	**19**	Tu	4 39	7 14
140	**20**	W	4 39	7 15
141	**21**	Th	4 38	7 16
142	**22**	F	4 37	7 17
143	**23**	Sa	4 36	7 18
144	**24**	S	4 36	7 19
145	**25**	M	4 35	7 20
146	**26**	Tu	4 34	7 20
147	**27**	W	4 34	7 21
148	**28**	Th	4 33	7 22
149	**29**	F	4 32	7 23
150	**30**	Sa	4 32	7 23
151	**31**	S	4 31	7 24

Moon's Phases.

Last Q., May 1, 8 h. 51 m., morn.
New M., May 8, 1 h. 15 m., morn.
First Q., May 15, 2 h. 4 m., eve.
Full M., May 23, 1 h. 25 m., eve.
Last Q., May 30, 1 h. 54 m., eve.

JUNE, 1891.

6th MONTH. 30 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
152	**1**	M	4 31	7 24
153	**2**	Tu	4 30	7 25
154	**3**	W	4 30	7 26
155	**4**	Th	4 30	7 26
156	**5**	F	4 29	7 27
157	**6**	Sa	4 29	7 28
158	**7**	S	4 29	7 28
159	**8**	M	4 29	7 29
160	**9**	Tu	4 28	7 30
161	**10**	W	4 28	7 30
162	**11**	Th	4 28	7 31
163	**12**	F	4 28	7 31
164	**13**	Sa	4 28	7 32
165	**14**	S	4 28	7 32
166	**15**	M	4 28	7 32
167	**16**	Tu	4 28	7 33
168	**17**	W	4 28	7 33
169	**18**	Th	4 28	7 33
170	**19**	F	4 28	7 34
171	**20**	Sa	4 29	7 34
172	**21**	S	4 29	7 34
173	**22**	M	4 29	7 34
174	**23**	Tu	4 29	7 34
175	**24**	W	4 29	7 34
176	**25**	Th	4 30	7 35
177	**26**	F	4 30	7 35
178	**27**	Sa	4 30	7 35
179	**28**	S	4 29	7 35
180	**29**	M	4 29	7 35
181	**30**	Tu	4 29	7 35

Moon's Phases.

New M., June 6, 11 h. 26 m., morn.
First Q., June 14, 7 h. 33 m., morn.
Full M., June 22, 0 h. 12 m., morn.
Last Q., June 28, 6 h. 15 m., eve.

JULY, 1891.

7th MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
182	**1**	W	4 32	7 35
183	**2**	Th	4 32	7 35
184	**3**	F	4 33	7 34
185	**4**	Sa	4 33	7 34
186	**5**	S	4 34	7 34
187	**6**	M	4 35	7 34
188	**7**	Tu	4 35	7 33
189	**8**	W	4 36	7 33
190	**9**	Th	4 37	7 33
191	**10**	F	4 37	7 32
192	**11**	Sa	4 38	7 32
193	**12**	S	4 39	7 31
194	**13**	M	4 39	7 31
195	**14**	Tu	4 40	7 30
196	**15**	W	4 41	7 30
197	**16**	Th	4 42	7 29
198	**17**	F	4 43	7 29
199	**18**	Sa	4 44	7 28
200	**19**	S	4 44	7 27
201	**20**	M	4 45	7 26
202	**21**	Tu	4 46	7 26
203	**22**	W	4 47	7 25
204	**23**	Th	4 48	7 24
205	**24**	F	4 48	7 23
206	**25**	Sa	4 49	7 23
207	**26**	S	4 50	7 22
208	**27**	M	4 51	7 21
209	**28**	Tu	4 52	7 20
210	**29**	W	4 53	7 19
211	**30**	Th	4 54	7 18
212	**31**	F	4 55	7 17

Moon's Phases.

New M., July 5, 10 h. 58 m., eve.
First Q., July 14, 0 h. 28 m., morn.
Full M., July 21, 8 h. 54 m., morn.
Last Q., July 27, 11 h. 32 m., eve.

AUGUST, 1891.

8th MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
213	**1**	Sa	4 56	7 16
214	**2**	S	4 57	7 14
215	**3**	M	4 58	7 13
216	**4**	Tu	4 59	7 12
217	**5**	W	5 00	7 11
218	**6**	Th	5 01	7 10
219	**7**	F	5 02	7 09
220	**8**	Sa	5 03	7 07
221	**9**	S	5 04	7 06
222	**10**	M	5 05	7 05
223	**11**	Tu	5 06	7 04
224	**12**	W	5 07	7 02
225	**13**	Th	5 08	7 01
226	**14**	F	5 09	7 00
227	**15**	Sa	5 10	6 58
228	**16**	S	5 11	6 57
229	**17**	M	5 12	6 55
230	**18**	Tu	5 13	6 54
231	**19**	W	5 14	6 53
232	**20**	Th	5 15	6 51
233	**21**	F	5 16	6 50
234	**22**	Sa	5 17	6 48
235	**23**	S	5 17	6 47
236	**24**	M	5 18	6 45
237	**25**	Tu	5 19	6 44
238	**26**	W	5 20	6 42
239	**27**	Th	5 21	6 41
240	**28**	F	5 22	6 39
241	**29**	Sa	5 23	6 37
242	**30**	S	5 24	6 36
243	**31**	M	5 25	6 34

Moon's Phases.

New M., Aug. 4, 0 h. 12 m., eve.
First Q., Aug. 12, 4 h. 11 m., eve.
Full M., Aug. 19, 4 h. 28 m., eve.
Last Q., Aug. 26, 7 h., 9 m., morn.

SEPTEMBER, 1891.

9th MONTH. 30 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
244	**1**	Tu	5 26	6 33
245	**2**	W	5 27	6 31
246	**3**	Th	5 28	6 29
247	**4**	F	5 29	6 28
248	**5**	Sa	5 30	6 26
249	**6**	S	5 31	6 24
250	**7**	M	5 32	6 23
251	**8**	Tu	5 33	6 21
252	**9**	W	5 34	6 20
253	**10**	Th	5 35	6 18
254	**11**	F	5 36	6 16
255	**12**	Sa	5 37	6 15
256	**13**	S	5 38	6 13
257	**14**	M	5 39	6 11
258	**15**	Tu	5 40	6 09
259	**16**	W	5 41	6 08
260	**17**	Th	5 42	6 06
261	**18**	F	5 43	6 04
262	**19**	Sa	5 44	6 03
263	**20**	S	5 45	6 01
264	**21**	M	5 46	5 59
265	**22**	Tu	5 47	5 58
266	**23**	W	5 48	5 56
267	**24**	Th	5 49	5 55
268	**25**	F	5 50	5 53
269	**26**	Sa	5 51	5 52
270	**27**	S	5 52	5 50
271	**28**	M	5 53	5 48
272	**29**	Tu	5 54	5 46
273	**30**	W	5 54	5 44

Moon's Phases.

New M., Sept., 3, 3 h. 16 m., morn.
First Q., Sept. 11, 6 h. 7 m., morn.
Full M., Sept. 18, 0 h. 3 m., morn.
Last Q., Sept. 24, 6 h. 7 m., eve.

OCTOBER, 1891.

10th MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
274	**1**	Th	5 56	5 43
275	**2**	F	5 57	5 41
276	**3**	Sa	5 58	5 39
277	**4**	S	5 59	5 38
278	**5**	M	6 00	5 36
279	**6**	Tu	6 01	5 35
280	**7**	W	6 02	5 33
281	**8**	Th	6 03	5 31
282	**9**	F	6 04	5 30
283	**10**	Sa	6 05	5 28
284	**11**	S	6 07	5 27
285	**12**	M	6 08	5 25
286	**13**	Tu	6 09	5 23
287	**14**	W	6 10	5 22
288	**15**	Th	6 11	5 20
289	**16**	F	6 12	5 19
290	**17**	Sa	6 13	5 17
291	**18**	S	6 14	5 16
292	**19**	M	6 15	5 14
293	**20**	Tu	6 16	5 13
294	**21**	W	6 18	5 12
295	**22**	Th	6 19	5 10
296	**23**	F	6 20	5 09
297	**24**	Sa	6 21	5 07
298	**25**	S	6 22	5 06
299	**26**	M	6 23	5 04
300	**27**	Tu	6 24	5 03
301	**28**	W	6 26	5 02
302	**29**	Th	6 27	5 01
303	**30**	F	6 28	4 59
304	**31**	S	6 29	4 58

Moon's Phases.

New M., Oct. 2, 7 h. 57 m., eve.
First Q., Oct. 10, 5 h. 56 m., eve.
Full M., Oct. 17, 8 h. 43 m., morn.
Last Q., Oct. 24, 8 h. 56 m., morn.

NOVEMBER, 1891.

11th MONTH. 30 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
305	**1**	S	6 30	4 57
306	**2**	M	6 31	4 56
307	**3**	Tu	6 32	4 54
308	**4**	W	6 34	4 53
309	**5**	Th	6 35	4 52
310	**6**	F	6 36	4 51
311	**7**	Sa	6 37	4 50
312	**8**	S	6 38	4 49
313	**9**	M	6 40	4 48
314	**10**	Tu	6 41	4 47
315	**11**	W	6 42	4 46
316	**12**	Th	6 43	4 45
317	**13**	F	6 44	4 44
318	**14**	Sa	6 46	4 43
319	**15**	S	6 47	4 42
320	**16**	M	6 48	4 41
321	**17**	Tu	6 49	4 40
322	**18**	W	6 50	4 39
323	**19**	Th	6 51	4 39
324	**20**	F	6 53	4 38
325	**21**	Sa	6 54	4 38
326	**22**	S	6 55	4 37
327	**23**	M	6 56	4 36
328	**24**	Tu	6 57	4 36
329	**25**	W	6 58	4 35
330	**26**	Th	6 59	4 35
331	**27**	F	7 00	4 35
332	**28**	Sa	7 01	4 34
333	**29**	S	7 03	4 34
334	**30**	M	7 04	4 34

Moon's Phases.

New M., Nov. 1, 1 h. 32 m., eve.
First Q., Nov. 9, 3 h. 46 m., morn.
Full M., Nov. 15, 7 h. 16 m., eve.
Last Q., Nov. 23, 3 h. 25 m., morn.

DECEMBER, 1891.

12th MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
335	**1**	Tu	7 05	4 34
336	**2**	W	7 06	4 33
337	**3**	Th	7 07	4 33
338	**4**	F	7 08	4 33
339	**5**	Sa	7 09	4 32
340	**6**	S	7 10	4 32
341	**7**	M	7 11	4 32
342	**8**	Tu	7 12	4 32
343	**9**	W	7 13	4 32
344	**10**	Th	7 14	4 32
345	**11**	F	7 15	4 32
346	**12**	Sa	7 15	4 32
347	**13**	S	7 16	4 33
348	**14**	M	7 16	4 33
349	**15**	Tu	7 17	4 33
350	**16**	W	7 18	4 33
351	**17**	Th	7 18	4 33
352	**18**	F	7 19	4 34
353	**19**	Sa	7 20	4 34
354	**20**	S	7 20	4 35
355	**21**	M	7 21	4 35
356	**22**	Tu	7 21	4 36
357	**23**	W	7 22	4 37
358	**24**	Th	7 22	4 37
359	**25**	F	7 23	4 38
360	**26**	Sa	7 23	4 39
361	**27**	S	7 23	4 39
362	**28**	M	7 23	4 40
363	**29**	Tu	7 24	4 40
364	**30**	W	7 24	4 41
365	**31**	Th	7 24	4 42

Moon's Phases.

New M., Dec. 1, 6 h. 45 m., morn.
First Q., Dec. 8, 0 h. 13 m., eve.
Full M., Dec. 15, 7 h. 52 m., morn.
Last Q., Dec. 23, 0 h. 38 m., morn.
New M., Dec. 31., 10 h., 19 m., eve.

STANDARD TIME.

For the convenience of the traveling public, the railroads of the United States and the Dominion of Canada on the 18th of November, 1883, adopted an arrangement by which 5 time-standards take the place of the 54 previously used in preparing their time-tables.

The standards adopted with names by which they are distinguished, and their distance in longitude and consequent difference in time from Greenwich are shown by the following table.

NAME.	CENTRAL MERIDIAN	HOURS.
Intercolonial..................	60° West	4 Slower
Eastern........................	75°	5
Central........................	90° from	6 than
Mountain.......................	105°	7
Pacific...	120° Greenwich.	8 Greenwich.

There are thus formed five "Time Belts," each comprising the area lying within 7½ degrees on each side of the different meridians, and measuring approximately 700 miles in breadth. In each of these time-belts, the standard time is one hour faster than in the adjoining time-belt on the West, and one hour slower than in that adjoining on the East. The boundary lines between the different time-belts are not strictly geographical, being arranged to correspond with important railroad points, as follows:—

INTERCOLONIAL TIMES is practically disregarded, as the country included lies so far to the eastward.

EASTERN TIME prevails over the whole section east of a line drawn from Buffalo, N. Y., through Pittsburgh, Pa.; Parkersburgh and Huntington, W. Va.; Bristol, Tenn., and Augusta, Ga., changing at these places (except Grand Trunk, of Canada, which changes at Sarnia) to

CENTRAL TIME which extends to the irregular line drawn from Brandon, Man., through Mandan, Dak.; North Platte, Neb.; Dodge City, Kan., to El Paso, New Mexico. West of this line,

MOUNTAIN TIME is in use, and covers the district up to another line, which, starting from Heron, Mont., passes through Ogden, Utah, to Yuma, Ariz.

PACIFIC TIME is used from this line to the Pacific Ocean.

The Standards adopted by the Railroads have also been very generally adopted by the cities and towns throughout the country in place of the local time; from which it may differ by nearly thirty minutes fast or slow, according as the locality is east or west of the standard meridian. The exact *plus* or *minus* correction to be applied in changing from local to standard time or *vice versa* may be easily calculated in the following manner:—Reduce the longitude of the given locality to time (by multlplying the degrees, minutes and seconds by 4, which gives hours, minutes and seconds) and subtract the longitude of the given meridian from it. For example, the longitude of Boston is 71° 4′ = 4h. 44m. Subtracting the longitude of the Eastern Standard Meridian 75° = 5h. from this, gives a *minus* result of 3° 56′ or 15m. 44sec. (say 16m.), as the difference by which Boston local meantime is faster than the Eastern Standard. In a similar manner, the local time of a place 3° 56′ West of the meridian, that is, long. 78° 56′ west, would be 15m. 44 sec. slow.

The following table gives the correction for a number of the principal cities of the continent.

STANDARD TIME TABLE.

Correction to be applied to local mean time to obtain standard time.

	Standard	Correction.		Standard	Correction.		Standard	Correction.
		m.			m.			m.
Eastport, Me. ...	Intercol.	+28	Columbia, S. C...	Eastern	+24	Memphis, Tenn..	Central.	——
Portland, Me.....	Eastern.	—19	Columbus, O....	Central.	—28	Mobile, Ala......	"	— 8
Montpelier, Vt...	"	—10	Detroit, Mich....	"	—28	New Orleans, La.	"	——
Boston, Mass.....	"	—16	Indianapolis, Ind.	"	—16	Austin, Tex......	"	+31
Springfield, Mass.	"	—10	Chicago, Ill......	"	—10	Cheyenne, Wyo..	Mount'n.	— 1
Providence, R.I.	"	—14	Springfield, Ill...	"	— 2	Denver, Col.	"	——
Hartford, Conn..	"	— 9	Galena, Ill.......	"	+ 2	Santa Fé, N.Mex	"	+ 4
Albany, N. Y....	"	— 5	Milwaukee, Wis.	"	— 8	Helena, Montana	"	—28
New York, N. Y.	"	— 4	St. Paul, Minn...	"	+12	Virginia City, N.	Pacific.	— 2
Utica, N. Y......	"	+ 1	St. Louis, Mo....	"	+ 1	San Francisco, C.	"	+10
Rochester, N. Y.	"	+11	Lawrence, Kan..	"	+21	Portland Ore.....	"	+11
Philadelphia, Pa.	"	+ 1	Omaha, Neb.....	"	+24	Quebec, Quebec.	"	—15
Harrisburg, Pa..	"	+ 7	Bismark, Dakota.	"	+43	Montreal, Quebec	"	— 6
Pittsburg, Pa....	"	+20	Savannah, Ga....	"	—36	Ottawa, Ont.....	"	+ 3
Baltimore, Md...	"	+ 6	Milledgeville. Ga	"	—27	Toronto, Ont...	"	+18
Washington, D.C	"	+ 8	Jacksonville, Fla.	"	—33			
Wheeling, W.Va.	"	+23	Louisville, Ky. ..	"	—18			

DIFFERENCE IN TIME (For Cable Purposes),

BETWEEN NEW YORK AND SOME OF THE PRINCIPAL COMMERCIAL CITIES OF THE WORLD.
This Table is Approximate; the odd seconds are not given.

	H.M.		H.M.		H.M.		H.M.
Aden	7.56 F	Brussels	5.14 F	Gibraltar	4.35 F	Moscow	7.25 F
Alexandria	6.56 F	Buenos Ayres	1.02 F	Greenwich	4.56 F	Panama	.12 S
Algiers	5.08 F	Cadiz	4.27 F	Hamburg	5.36 F	Paris	5.02 F
Amsterdam	5.16 F	Calcutta	10.50 F	Havana	.33 S	Rio de Janeiro	2.03 F
Antwerp	5.13 F	Canton	11.31 S	Hong Kong	11.27 S	Rome	5.46 F
Athens	6.31 F	Cape Town	6.10 F	Lisbon	4.19 F	St. Petersburg	6.57 F
Bahia	2.34 F	Christiania	5.39 F	Liverpool	4.44 F	Stockholm	6.08 F
Berlin	5.50 F	Constantinople	6.53 F	London	4.56 F	Sidney	9.59 F
Berne	5.26 F	Copenhagen	5.46 F	Madrid	4.42 F	Valparaiso	.10 F
Bombay	9.48 F	Dublin	4.31 F	Melbourne	9.14 F	Vera Cruz	1.29 S
Bordeaux	4.53 F	Edinburgh	4.43 F	Mexico City	1.40 S	Vienna	6.01 F
Bremen	5.31 F	Geneva	5.21 F	Montevideo	1.11 F	Yokohama	10.45 S

F—*Fast of N. Y. Time.* S—*Slow of N. Y. Time.*

The Difference in time is calculated on actual New York Mean Time, 74° of longitude west of Greenwich. For the new Standard Time, 75th Meridian west of Greenwich, for places west of New York, subtract 4 minutes; for places east of New York, add 4 minutes.

LEGAL HOLIDAYS IN THE VARIOUS STATES.

JANUARY 1. NEW YEAR'S DAY: In Alabama, Arkansas, California, Colorado, Connecticut, Dakota, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Louisiana, Maine, Maryland, Michigan, Missouri, Nevada, New Jersey, New York, North Carolina, Ohio, Oregon, Pennsylvania, South Carolina, Tennessee, Texas, Utah, Vermont, West Virginia, Wisconsin and Wyoming.

JANUARY 8. ANNIVERSARY OF THE BATTLE OF NEW ORLEANS: In Louisiana.

*FEBRUARY 22. WASHINGTON'S BIRTHDAY: In Alabama, California, Colorado, Connecticut, Dakota, Georgia, Idaho, Illinois, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nevada, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Texas, Utah, Virginia, Wisconsin, and Wyoming.

FEBRUARY 17. MARDI GRAS: In Louisiana.

MARCH 2. ANNIVERSARY OF TEXAN INDEPENDENCE: In Texas.

MARCH 4. FIREMEN'S ANNIVERSARY: In New Orleans, La.

MARCH 27, 1891. GOOD FRIDAY: In Louisiana, Maryland, and Pennsylvania.

APRIL 21. ANNIVERSARY OF THE BATTLE OF SAN JACINTO: In Texas.

*APRIL 26. MEMORIAL DAY: In Georgia.

MAY 30. DECORATION DAY: In California, Colorado, Connecticut, Dakota, Iowa, Illinois, Kansas, Kentucky, Massachusetts, Michigan, Nevada, New Hampshire, New Jersey, New York, Ohio, Oregon, Pennsylvania, Rhode Island, Utah, Vermont, Wisconsin, and Wyoming.

JUNE 1. LABOR DAY: In Oregon.

JULY 4. INDEPENDENCE DAY: In all the States except Nebraska.

SEPTEMBER 7, 1891. LABOR DAY: In Colorado, Massachusetts, New Jersey, and New York.

NOVEMBER 3, 1891. GENERAL ELECTION DAY: In California, Dakota, Kansas, Maryland, Missouri, New Hampshire, New Jersey, New York, Ohio, Oregon, South Carolina, and Wisconsin.

NOVEMBER 26, 1891. THANKSGIVING DAY: Is observed in all the States, though in Nebraska and some others it is not a statutory holiday.

DECEMBER 25. CHRISTMAS DAY: In all the States except Nebraska.

Sundays and Fast Days (whenever appointed) are legal holidays in nearly all the States.

ARBOR DAY is legal holiday in Idaho and Kansas, the day being set by the Governor. Arbor Day is also a legal holiday in Rhode Island, but does not affect the payment of notes, etc.

In Minnesota, Washington's Birthday is the only general holiday expressly provided by law. As to the maturity of bills and notes, the following days are by implication holidays: Thanksgiving Day, Good Friday, Christmas, January 1st. and July 4th; as to schools, Christmas, January 1st, July 4th, Memorial Day, and Thanksgiving Day.

In Nebraska there are no legal holidays established by statue. The same is the case in New Mexico.

Every Saturday after 12 o'clock noon is a legal holiday in New York.

**NOTE.*—Holidays falling on Sunday are usually kept on the Monday following.

WEATHER INDICATIONS.

Sunset Colors.—A gray, lowering sunset, or one where the sky is green or yellowish green, indicates rain. A red sunrise, with clouds lowering later in the morning, also indicates rain.

Halo (Sun Dogs).—By halo we mean the large circles, or parts of circles, about the sun or moon. A halo occurring after fine weather indicates a storm.

Corona.—By this term we mean the small colored circles frequently seen around the sun or moon. A corona growing smaller indicates rain; growing larger, fair weather.

Rainbows.—A morning rainbow is regarded as a sign of rain; an evening rainbow, of fair weather.

Sky Color.—A deep blue color of the sky, even when seen through clouds, indicates fair weather; a growing whiteness, an approaching storm.

Fog.—Fogs indicate settled weather. A morning fog usually breaks away before noon.

Visibility.—Unusual clearness of the atmosphere, unusual brightness or twinkling of the stars indicates rain.

Clouds.—In observing clouds, we observe their kinds, motions, and outlines. The clouds frequently called "mare's tails" we term Cirri. They are marked by their light texture, fibrous and sundered as in the "mare's tail," or interlacing, as in the far-spreading white cloud, which produces the halo. Small, regularly formed groups of these clouds are frequently seen in fair and settled weather. . The Cirri are also the clouds on the fore-part of the storm. In this case they are usually more abundant, their outline is very ragged, and they gradually blend into a white, far-reaching cloud bank. The cloud well known as "cotton bales," or "thunder heads," we term cumulus. When they appear during the heat of the day and pass away in the evening, continued fair weather may be expected. When they increase with rapidity, sink into the lower part of the atmosphere, and remain as the evening approaches, rain is at hand. If loose patches appear thrown out from their surfaces, showers may be expected. The clouds usually seen after nightfall, lying in one horizontal plane, and not of great extent, are attendant on fine weather. Small, black, inky clouds and dark scud indicate rain.

Frost.—The first frost and last frost are usually preceded by a temperature very much above the mean.

TABLE

SHOWING THE NUMBER OF CLOUDY, CLEAR, AND RAINY DAYS IN EACH MONTH.*

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Clear	11.0	9.8	11.0	10.3	9.6	10.0	11.2	10.8	12.7	12.0	10.3	10.0
Cloudy	11.0	9.9	10.8	10.4	11.5	11.0	11.1	10.3	10.4	12.0	11.9	11.7
Rain or Snow	9.2	8.2	9.1	9.2	9.8	8.8	8.4	8.1	6.8	6.8	7.8	9.2

* From the Meteorological Tables in "The Connecticut Almanac," prepared by Prof. A. W. Phillips, of Yale College.

L. J. M. DAGUERRE.

After Lithograph in his own book, 1839.

L. J. M. DAGUERRE.

From Woodburytype print in "Year Book of Photography" for 1881; stated to be after Daguerreotype taken by J. E. Mayall in 1846; but undoubtedly one of the Meade originals, made in 1848.

L. J. M. DAGUERRE.

From original Daguerreotype made by Chas. R. Meade in 1848; now in U. S. National Museum, Washington.

L. J. M. DAGUERRE.

After original Daguerreotype made in 1848 at Brie-sur-Marne, by Chas. R. Meade.

NEVER BEFORE PUBLISHED.

Reproduced through courtesy of Mrs. S. M. Valentine.

THE AMERICAN ANNUAL OF PHOTOGRAPHY, AND PHOTOGRAPHIC TIMES ALMANAC.

1891.

PORTRAITS OF DAGUERRE.

WHAT are the authentic portraits of Daguerre? is a question which came up sharply to the attention of some of those interested in the recently erected memorial at Washington. Although seemingly a simple query, the answer to it is not easily found—and some account of the *data* which have been secured in an attempt to reach a conclusion is here given.

The earliest portrait which has come to my attention is that accompanying the second edition of Daguerre's own book, "History and Description of the Daguerreotype Process, and the Diorama," published in Paris, in 1839. This is a lithograph; and as it is not stated to be "after a Daguerreotype" it was probably drawn from life—the usual method of portraiture at that epoch. Indeed, it would have been a matter of surprise, had such an origin been attributed. The portrait in question represents a young man in the fashionable costume of the time, with neck-enveloping stock, and in his *left* lapel, the ribbons of the Legion of Honor. The hair is pushed to the right, and in the face can be easily traced the resemblance to the later portraits.

In addition to Daguerre's traditional aversion to sitting for his portrait, he himself made scarcely any portrait work; having worked out the process, he left it to others to study the applications; and to our own Dr. Draper is by common consent attributed the distinction of having first applied Daguerre's process to portraiture, in his historical experiments on the top of the University building in New York City.

Incidentally, let us quote from the late M. A. Root's book, "The Camera and the Pencil," published in 1864 (p. 390).

> "Mr. N. G. Burgess was in Paris, early in 1840, the period when Daguerre, through his recent discovery, was the observed of all observers, and naturally made some investigations of the art as then known and practised. His business there brought about an acquaintance with one of the artisans who had taken part in constructing Daguere's first sun-painting apparatus. From him and another person he took his earliest daguerreotype lessons, and sketched some of the public edifices of Paris. Owing to his imperfect appliances, his pictures, he says, were very unsatisfactory. Hearing that Professors Draper and Morse had produced portraits from life, he proposed to the artisan above mentioned to attempt his (Burgess') portrait. The result, however, of 8 or 10 minutes exposure to the solar ray was so wretched, that the experiment was abandoned, under the conviction that portraits could never be thus taken."

The next portrait, in point of time, that I find, is that reproduced as frontispiece to the "Photographic News Year Book," for 1881; which is stated to be copied from a Daguerreotype taken in 1846 by J. E. Mayall.

Mr. Root records* the fact that Mr. Mayall sold his Philadelphia establishment on June 20th, 1846, and returned to London. It may therefore have been that he visited Paris in that year and secured this picture, but I have been as yet unable to communicate with him or get any further particulars.

Mr. Root says, however: †

> "It may not be generally known, that Daguerre had so strong an objection to having his portrait taken, that he never (it is believed) sat to but one photographer; and this was our countryman, Charles R. Meade, of the firm of Meade Brothers, in New York. Mr. Meade being in France in 1848, visited Daguerre's chateau (?) at Brie sur Marne, for the purpose of taking his portrait—not being aware of Daguerre's objection to being thus represented. Mr. Meade's request was politely but firmly negatived, as had been the request of many others—among them two artists from the United States. Eventually, however, through the urgent persuasion of his wife and niece, Daguerre was induced to sit, and five or six Daguerreotypes of him were taken by Mr. Meade, from which numerous copies were afterwards produced in the various modes of representation."

Mr. Root wrote this in 1863. More than twelve years before, in the first number of the *Daguerreian Journal*, dated November 1, 1850, occurs the following paragraph: ‡

> "The engraved likeness of Daguerre on our cover page was executed by the excellent engraver, N. Orr, and for the original daguerreotype, from which the likeness was designed, we are indebted to Meade Bros., of this city, who have a fine daguerreotype and the only one in this country, of the discoverer of this art."

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* "The Camera and the Pencil," p. 363.
† *Loc. cit.*, p. 385.
‡ Page 17,

Here is a discrepancy of statements which, in the absence of exact knowledge, are not easily reconciled. It seems certain that at least *two* originals were made by Meade Bros., since they exist to-day. One of these is now in the National Museum at Washington, having been presented by Mr. G. Cramer, of St. Louis; he had it from Mr. Abram Bogardus, who writes me that he had it direct from the elder Meade,

FROM COVER OF DAGUERREIAN JOURNAL, 1850.

father of the "Meade Bros.," after the sons were dead. This seems to me to be the original from which so many copies have been made, and which is referred to in the extract quoted from the *Daguerreian Journal.* It is also copied in an enlarged size, as one of the plates of the *Photographic and Fine Art Journal*, in 1854 (I think, but cannot refer to it

exactly). It is now badly scratched; Mr. Bogardus states that it was in this condition when received by him.

The second undoubted original is still in the possession of the Meade family; it is smaller than the other, and not so good technically; the other arm supports the head, and less of the chair and table cover is visible. The surface is not scratched, however, and is in good condition.

A not unreasonable conclusion, then, is this—that the National Museum portrait is the well-known one, which the *Daguerreian Journal* understood to be the only one; while Meade really made two; Root, understanding that *more than one* was made, made the rather loose statement that there were five or six. This does not appear probable on the face of it, that so many originals could have been made, taking into consideration the length of the sitting and attendant operations of coating and development, together with the frame of mind of a naturally restless dyspeptic *who had been persuaded to sit against his own inclinations.

I have talked with several persons who remember seeing the National Museum portrait hanging in the Meade gallery where it attracted much attention; probably, as the better one of the the two this was exhibited there, while the other, less successful, was kept as a souvenir at Mr. Meade's home.

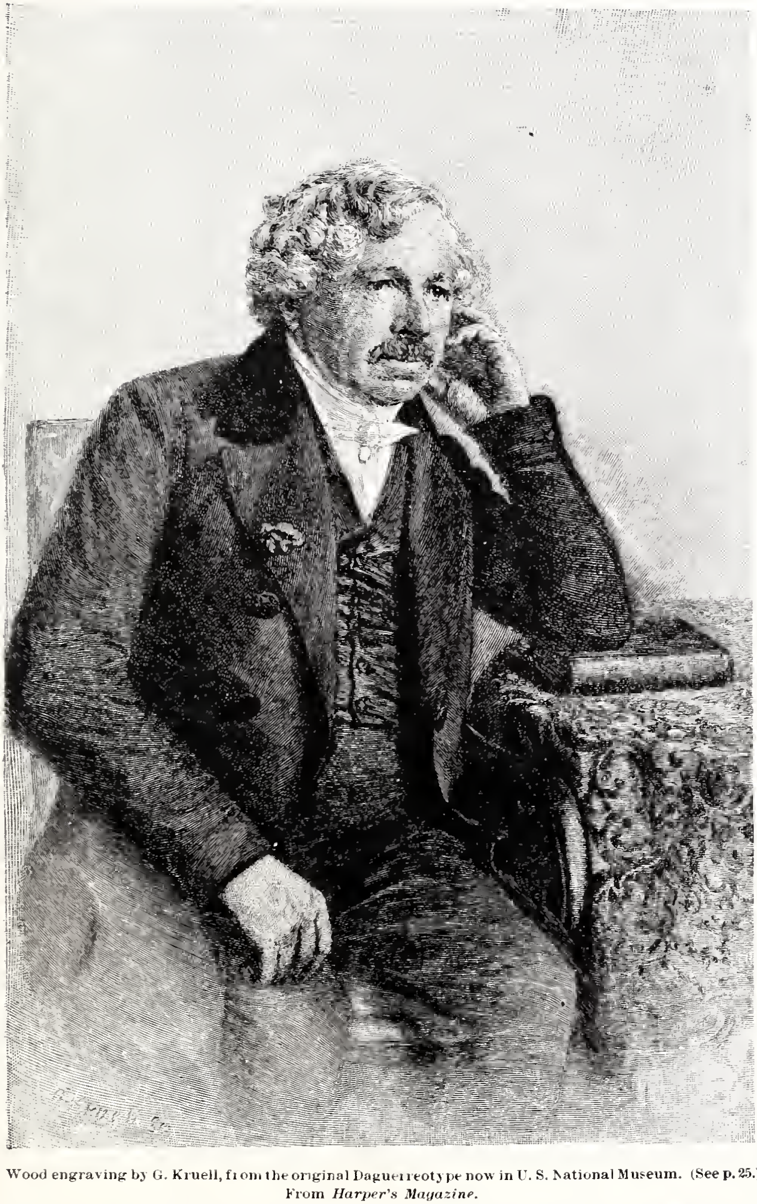
If there were "five or six" where are the three or four others, at present (so far, as I know) unaccounted for?

That there is somewhere in existence another original, is shown by the cut herewith reproduced by the kindness of Mr. Jerome Harrison, from his "History of Photography," but I have not succeeded in tracing it, as yet.

Other authorities which may be considered semi-authentic, are furnished by the bust and oil portrait made by Charpentier, a friend and co-temporary of Daguerre, after the latter's death. The painting is now in possession of the French Government, while the original bust belongs to the Société Française de Photographie; a replica of it, presented by them, now adorns the rooms of the Society of Amateur Photographers, in New York.

In G. Tissandier's "History and Handbook of Photography" (both the original and Thomson's translation) occurs a wood engraving, after the lithographed portrait first mentioned.

*Early in 1840, Mr. Burgess saw Daguerre in Paris, and says his manner was reserved and distant. He appeared very nervous and restless—symptoms ascribed to his being affected with dyspepsia. (Camera and Pencil, page 390.)



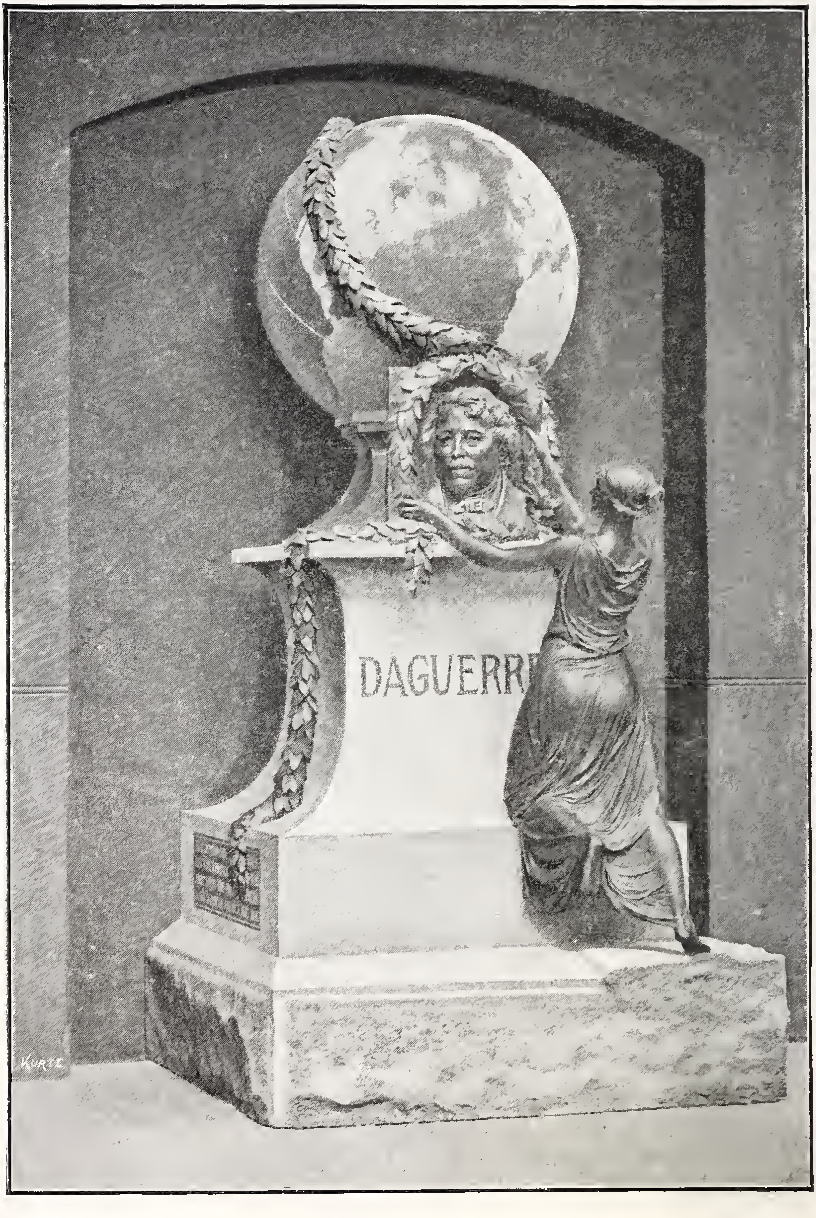
Wood engraving by G. Kruell, from the original Daguerreotype now in U. S. National Museum. (See p. 25.)
From *Harper's Magazine.*

From carbon print of painting by Charpentier, in possession of the French Government.

From " \ History of Photography," by W. Jerome Harrison.

Bust by Charpentier, now in possession of Society of Amateur Photographers of New York.

From Vienna Medal.



Negative by J. W. Smillie. Kurtz Process.

DAGUERRE MONUMENT,
United States National Museum, Washington.

Eder's "Jahrbuch" for 1890, has a process cut printed in two colors, from a worked-up copy of the Mayall original.

Harper's Magazine for August 1889, has a wood-cut illustrating Mr. J. Wells Champney's article, from the National Museum original, in which the engraver has supplied some deficiencies in the accessories; it is, however, a fair translation.

We may pass over the slight outline heads which have done duty on the covers of various photographic periodicals, from

FROM THE DAGUERRE MONUMENT, BRIE-SUR-MARNE.

the *Photographic Art Journal* down to the *St. Louis Photographer*, in this country, and others too numerous to mention abroad; they are all taken either from the "Mayall," or the Meade pictures.

At Brie-sur-Marne, the bronze bust on Daguerre's monument seems to be from Charpentier's model.

The profile on the Vienna bronze medal we cannot exactly attribute; it was probably modeled by the engraver with the

assistance of the bust, although the treatment of the moustache is quite different.

The most recent portrayal of Daguerre's features is the three-quarter medallion head by the sculptor Hartley, from the Memorial in the National Museum at Washington. This was based on the Meade original.

Should any of the readers of this brief study possess further information bearing on this subject, I will be very grateful if they will kindly communicate with me.

C. W. Canfield.

COATING PORCELAIN AND PAPER WITH GELATINO-CHLORIDE OF SILVER EMULSION.

In the AMERICAN ANNUAL OF PHOTOGRAPHY AND PHOTOGRAPHIC TIMES ALMANAC for 1888, page 185, Dr. Geo. Sinclair gives a very excellent article under the head of "Lantern Slides and Transparencies" in which he suggests the formula given below for making them.

I have tried it for the above purpose and find that it works admirably. The thought suggested itself to me to apply it for the coating of porcelain and also paper, which I did with the most excellent results.

The Gelatino-Chloride of silver emulsion, for such it is, is prepared as follows:—

A—Soft Gelatine	40 grains.
Acetate of Soda	8 "
Water	2 ounces.

First dissolve the soda in the water, then add the Gelatine, and place the vessel containing the solution in warm water to melt the gelatine.

B—Nitrate of Silver	28 grains.
Water	1 ounce.

Add this solution to A when the gelatine is melted and shake well.

C—Chloride of Sodium	4 grains.
Acetate of Soda	6 "
Water	1 ounce.

Dissolve and add to A B with thorough shaking.

D—Hard gelatine (Hinrich's)	160 grains.
Water	3 ounces.

Soak for fifteen minutes, then pour off the water not absorbed by the gelatine and add to A B C.

Put the vessel containing the entire mixture in water at 100 deg. Fahr. until the gelatine is melted and incorporated; now add one-half ounce alcohol and enough water to make it measure six ounces; then filter through two thicknesses of fine muslin and your emulsion is ready.

These operations can safely be carried on by lamp light.

Dr. Sinclair recommends leaving the mixture standing for twenty-four hours, but for the purpose that I use it, it is better to use immediately, as it gives much clearer whites.

This emulsion can be used on porcelain and paper, but inasmuch as the operations are entirely different, we must consider them separately.

Let us first take porcelain:

You can obtain the porcelain plates at any art store, cut to any desired size; I buy mine of Messrs. C. T. Raynolds & Co., New York.

The porcelain is first prepared by washing it in a strong solution of Sal-soda and water, which will remove all spots; after being well rinsed and thoroughly dried, coat with a substratum prepared as follows:

Albumen	1 ounce.
Water	20 ounces.
Alcohol	1 ounce.
Carbolic Acid	20 drops.

Add the acid to the alcohol aud stir well, next pour the mixture into the albumen and water, which have been thoroughly mixed, then filter. It is not necessary to make up the entire quantity if you are careful to observe these proportions.

The substratum is best spread on the porcelain with a camel's hair chisel brush; one about two or three inches wide is a good size.

But a piece of woollen flannel, thoroughly washed, tied over the edge of a four by five negative glass makes an excellent substitute for a brush, and is easily prepared and less expensive.

The substratum should be spread on evenly and thin and the plate laid down flat to dry, care being taken that no hairs from the brush adhere to the surface.

There is no danger of frilling when this substratum is used; after it is dry the plates are ready to coat with the emulsion.

First warm a plate until it is quite hot, so that it can be handled comfortably, then pour on enough of the emulsion (previously melted by standing the bottle in water at 100 deg.

Fahr.) to just cover the plate when spread around by the finger; the warm plate will keep the emulsion liquid until it can be guided evenly over the surface and carried well out to the edges. The thinner the coating the better. After the plate is evenly spread set it down quickly on a level slab so it will not have opportunity to settle unevenly. After coating the plates, set them to dry in an ordinary negative rack, as there is no danger of the emulsion running after it is set. It is a good plan to coat the plates in the evening and put them in a dark-room with a temperature of about 70 deg. Fahr.; they will be dry by morning and ready to print, which is done by placing them in an ordinary printing frame, and exposing them to sunlight under a negative. Printing can be hastened by fuming the plates for fifteen minutes over ammonia.

As it is impossible to examine the plate during the process of printing, it is a good plan to coat some paper at the same time the plates are coated, and expose under the negative before the plates are printed, noting carefully the time required to make the print; then expose the plate the same length of time, and under the exact conditions.

As the plates lose density during toning and fixing, it is well to carry printing somewhat beyond the density desired in the finished print. After printing the plates should be washed before toning by placing them in running water for a few minutes. They are then toned in about the same manner as albumen prints. The Chautauqua toning bath given on page 49 of the "Photographic Instructor," will give excellent results. They tone quickly and give tones ranging from a beautiful sepia to a blue. Care should be taken not to overtone, as the prints fix much bluer than they are when they leave the toning bath.

Prints fixed without toning give a deep, yellowish-brown that makes a very pleasing picture.

Fix in hypo and water, one to eight, for fifteen minutes; then wash for an hour in running water; after drying the print is finished.

The paper is coated by floating on the melted emulsion. Saxe paper is the best and should always be used.

Procure a flat porcelain tray large enough for your paper, and a shallow tin pan somewhat larger than your tray, set the tray in the pan and elevate about one-quarter of an inch from the bottom by means of two flat strips placed under the ends of the tray; then fill the pan about half-way to the top of the tray with water, and place on a small oil stove; now pour the

emulsion previously melted into the tray, being careful to avoid all air bubbles. By regulating the flame of the stove you can control the temperature of the emulsion very easily. Keep it at 100 deg. and the paper will coat readily.

Float the paper by first placing one end of the sheet on the emulsion and gently lowering until it rests in perfect contact, allow it to remain a few seconds, then lift one corner and remove the sheet from the tray. Keep the sheet turning in a circular motion by the corners until the emulsion is set; it can then be hung by a clip to dry, which will require only a few hours.

It is toned and fixed in the same manner as the porcelain plates. This paper makes a beautiful picture when, after thorough fuming, it is fixed without toning.

I think it a good idea to make the emulsion somewhat thinner for coating the paper than when coating the plates; this can be done by adding an ounce or so more water to the emulsion than is called for in the formula.

W. S. Waterbury.

A TRUNK FOR PHOTOGRAPHIC TOURISTS.

There are many amateurs who realize that good results can only be secured with certainty, under favorable conditions; and these conditions in the majority of cases each must create for himself out of such material as chance or forethought provides. A small amount of extra baggage, which has the advantage of keeping together all the photographic "impedimenta," as well as making one independent of bath-tub or wash-stand arrangements for developing, and particularly for thoroughly washing plates, will seldom be objected to. The arrangement which I have devised, here described, has proven of great convenience in my own work; it may possibly be of advantage to others whose experiments are similar, or afford a hint in cases where the conditions are different.

The trunk is of wood, with metal trimmings, of the sort usually called "steamer" trunks, and measures when closed 32 inches long, 19 inches wide, and 13 inches high. A tray, not shown in the cut, goes in the usual position, occupying the space under the cover when closed. This can be utilized for clothing, if no separate trunk or valise is taken, or contain additional supplies if the trunk is wholly devoted to uses photographic.

Below this tray is packed a shallow tray or shelf, laid on top of the trunk in the cut; this is made of light wood with raised edges, and a rectangular opening as shown. The top is covered with zinc; on the underside are grooves, arranged to receive the outwardly beveled edges of the wash-box, which is also zinc-lined, and is fastened to the bottom of the trunk by four screws put through from the outside. By turning out these screws and removing the wash-box, the trunk loses

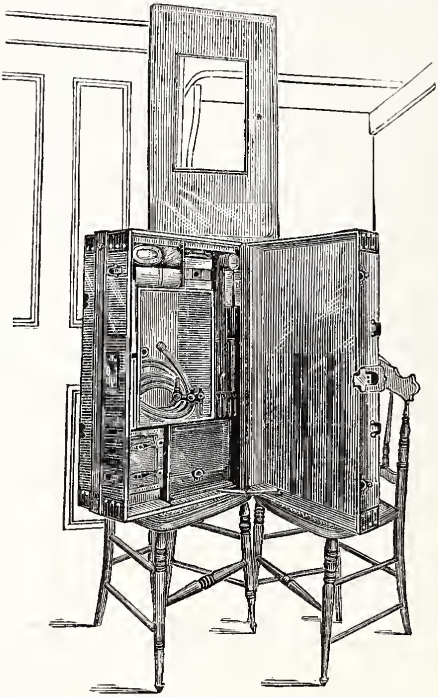


Fig. 1.

its photographic character and can be used for ordinary packing purposes. Through the bottom of the wash-box and of the trunk, there is an opening with brass coupling into which the corresponding attachment on the end of the rubber waste-pipe is secured.

A 5x8 camera in its carrying-case packs away in the interior of the wash-box; while the spaces between its exterior and

the sides of the trunk serve to accommodate two extra holders, two boxes of plates, two 5x8 trays, as well as a 4x5 detective camera with six holders and several dozen plates; and the various *et ceteras*—chemicals, bottles, graduates, scales, lantern, sponge, printing frame, etc.—which experience may suggest or necessity dictate.

After unpacking from the lower part such things as will be needed in developing, the trunk is supported on two chairs,

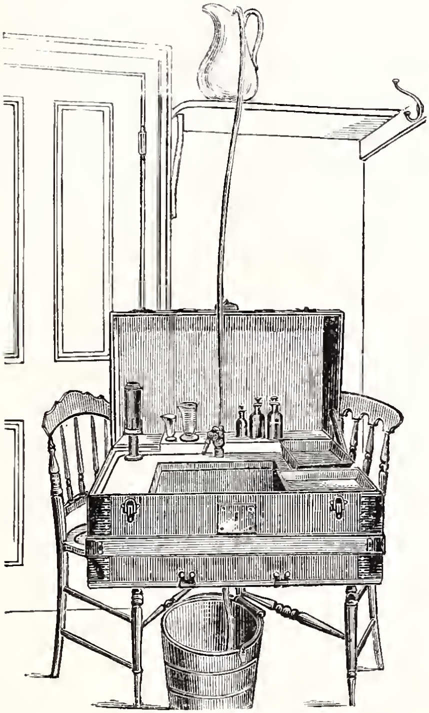


Fig. 2.

as shown in Figure 2; the shelf adjusted in position over the wash-box, thus forming a complete and convenient developing-sink; the waste-pipe attached and led into a pail placed below, and a rubber pipe carried from the faucet (extemporized for this purpose from a small Y gas-fitting, with two burners and a stop-cock and fitting into a hole in the shelf) to a pitcher or other receptacle full of water, on a shelf above.

The flow once started, on the syphon principle, is controlled by the faucet.

In developing plates in the daytime, of course all daylight must be excluded from the room. I usually carry a couple of curtains made of two thicknesses of heavy black satteen, with small rings sewed to the edges. By means of screw-hooks, these can be quickly adjusted over windows or doors. I usually try to get a room with one window only, and put both curtains over that, for greater security. At night the obscuring of the windows may be dispensed with.

For changing plates in the daytime I have a bag or cover, made of the black satteen, that fits over the top and sides of the trunk, the lid being fastened open at an angle of 45 deg. There are two sleeves in front, and the whole is kept closely in place by elastic bands. The hands being inserted through the sleeves, the changing can be effected by touch.

For prolonged washing of plates, a cork can be inserted in the outlet of the wash-box, or a "kink" made in the waste pipe and secured by a string. *Charles Simpson.*

THE BYE-WAYS OF PHOTOGRAPHY.

As in our way through the world it is good now and again to leave the beaten paths of business or pleasure and turn aside in search of new lines of work or fresh scenes of enjoyment, so the working photographer may profitably vary the steady routine of making portraits, landscapes or copies, by occasionally wandering off into a bye-path, ending likely enough in a blind alley, but with always a hope of finding some yet undiscovered possibility or a new fact which he or others may turn to account now or hereafter.

It is indeed difficult to move in any direction off the ordinary track of photographic work, without coming upon something which will repay the detour. On all sides there are old theories and observations to be confirmed or carried forward with improved knowledge and appliances, with new ones to be discovered and worked out.

Of all the graphic arts photography is the only one which is not only in itself a most complex science, but is in the closest alliance with all the sciences as their most trustworthy observer and recorder. The painter, engraver or draughtsman, however skilled he may be, can at best only very imperfectly depict what he can see or imagine, while the photog-

rapher working with light as the pencil of nature, is able to obtain records absolutely accurate in almost all but color, not only of things that he can see, but of many things that are quite beyond the power of human vision. In the selection and arrangement of many of his subjects there is full scope for the exercise of the highest artistic talent and skill; while for the actual delineation on paper, he has, besides his own special purely photographic methods, command of all the resources of the engraver on wood or copper, the lithographer and the letterpress printer, which he may work almost automatically.

The photographer thus stands, as it were, at a central point, with the sciences opening out on one side around him and the graphic arts on the other. He need only take his choice which to follow. In all there is something for him to do.

However, going no further than his own science of photography, he will find countless openings for investigation in every branch of it. In negative work we seem almost to have reached the practical limit of sensibility, and in portability little more is to be desired; but a new vehicle for the sensitive salt of silver, which could be as readily applied and dried as collodion, but have all the sensitiveness of gelatine, would be a boon to many who, though gladly accepting ready-made gelatine dry-plates as they find them, would be glad to be able to prepare their plates themselves in some simpler way, independent of climate, that they might know exactly what they were working with. Although our old and well-tried friend *Pyro* holds its own, and other good developing agents of recent introduction are available, there is still room for new ones to meet the various requirements of modern photography, especially for instantaneous work and copying. Hyposulphite of soda has advantageously replaced cyanide of potassium for fixing negatives, but a new reliable fixing agent for silver prints, free from the objections to the much-abused *Hypo*, is an important desideratum.

The reversal of the negative photographic image on development is a fruitful subject for further enquiry, both for the light that may be thrown on the nature of the latent image and the theory of development, as well as with the object of obtaining direct transparencies in the camera, which would have many useful applications in heliogravure and other processes of photo-mechanical printing—and further, might be a means of producing lantern-slides direct from nature.

The successful application of orthochromatic photography

chiefly depends on the use of suitable screens for exalting the action of the less refrangible rays on the stained plate. The subject has been fairly worked out for yellow, but much remains to be done in the investigation of new dyes, in methods of staining plates, and in the preparation and use of suitable color-screens. Means of obtaining increased sensitiveness to red and green are wanted.

Printing processes, both photographic and mechanical, have been enormously increased in number and improved within the last few years, and there is now no lack of means of producing prints for all purposes. Still the wanderer in a bye-path that would lead him to a cheap and simple process of readily producing permanent and presentable prints, suitable for ordinary work in hot, damp climates, would earn a great debt of gratitude, if he did not gain a more substantial reward.

The working of light on various substances offers an almost inexhaustible mine of undiscovered facts, which would immensely enlarge our knowledge of sensitive photographic agents and their mode of action under the influence of light. I can imagine no better exercise for a young photographer with leisure, than to take up and go through again, by the light of more modern knowledge, some of the work in this direction of the older photographic experimentalists, such as Herschel, Becquerel, Hunt, Draper, Carey Lea, Abney and others. He would learn much and might discover much.

Although it seems most unlikely, but perhaps not absolutely impossible, that any really practical method will be discovered for photographing objects in their natural colors, there is ample field for further research in this direction, which would undoubtedly yield results of high scientific interest, even though they might not have a perfectly practical result. It may yet happen that by some fortunate chance, or in the course of the further development of our knowledge, this, the greatest and most difficult of photographic problems, will be solved. The most recent experiments seem to be but reflections of the older ones, and it is difficult to see in what new direction a start can be made, though it seems not impossible that suitable dyes and color screens to be used successively for bringing out different parts of the picture might be of use, if once a suitable sensitive surface can be found.

On the artistic side of photography, attractive and pleasant bye-paths are open on every hand, but enough has perhaps been said to show how much there is yet to be done in out-of-the-way directions, and it is to be hoped that the younger genera-

tion of photographers, who have things made so much easier for them than was the case in the earlier days of collodion photography, will take full advantage of the greater facilities they now enjoy for exploring the bye-paths and pushing on the science, as well as following the practice in the beaten tracks, and there seems every reason to believe that they will do so. *Colonel J. Waterhouse, B.S.C.*

A CONVENIENT HAND-CAMERA SHUTTER.

The shutter that I shall endeavor to explain by this article and the accompanying illustrations, I have used on all kinds of hand-camera work with good results.

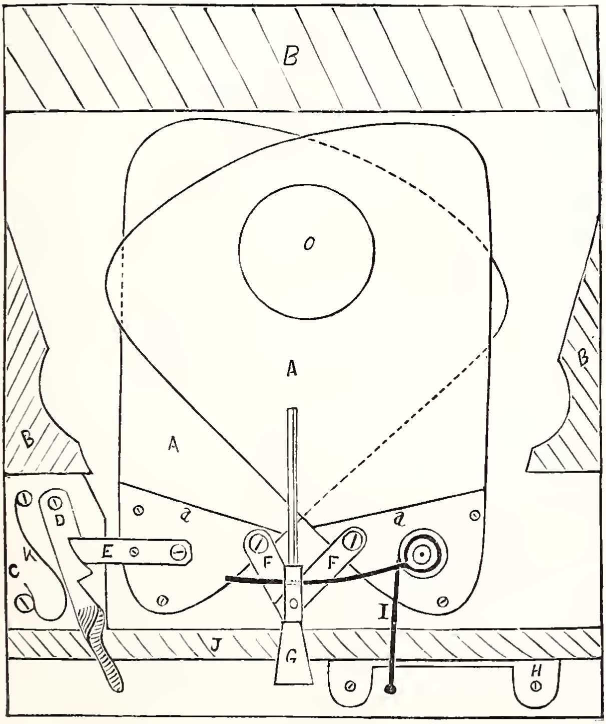


Fig. 1.

If the shutter is never used, as it is here shown, by any reader of the Annual, it may at least give an idea to some

mechanic who will improve the opportunity, excuse me! I should say shutter, and get some benefit therefrom.

The shutter is made upon the front-end board of the camera, which in the one I have is of $\frac{1}{2}$ inch white wood.

By reference to the diagram, the working will be readily understood. A A are the shutter wings made of one sixteenth

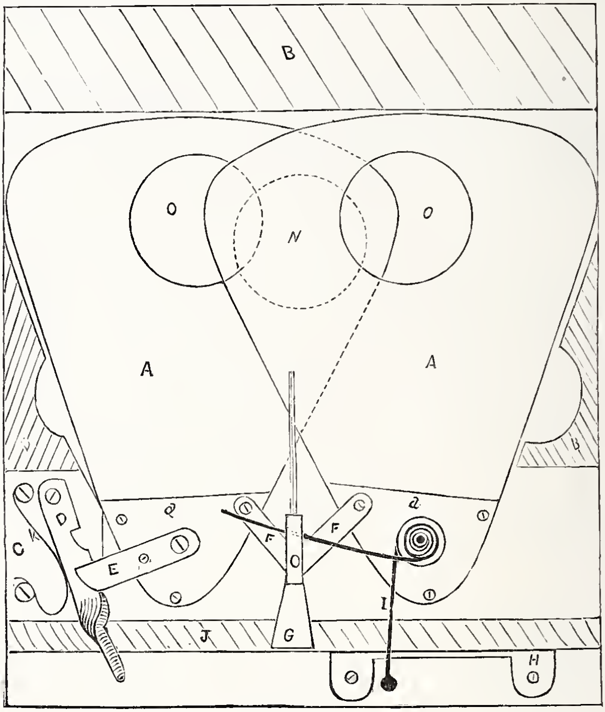


Fig. 2.

inch sheet rubber, re-inforced at (a a) by an extra thickness to give more chance to make a good thread there for the screws and on the right hand one a piece is also put on the bottom to raise it above the left hand one, so as not to bind when working.

After drilling and fitting the wings so that openings in them (O O) will register with the opening N in the front board the links F F should be put in position and the piston G fastened in place; the links and piston are fastened by

a pin that is soldered to the lower link and works easily in the other link and piston, and has a nut to keep all in place.

On the correct drilling of these links depends the easy working of the shutter.

The lever E is rigidly fastened to left hand wing and holds the shutter either open for focusing or closed ready for an exposure. C is a piece of one-sixteenth inch bràss screwed to

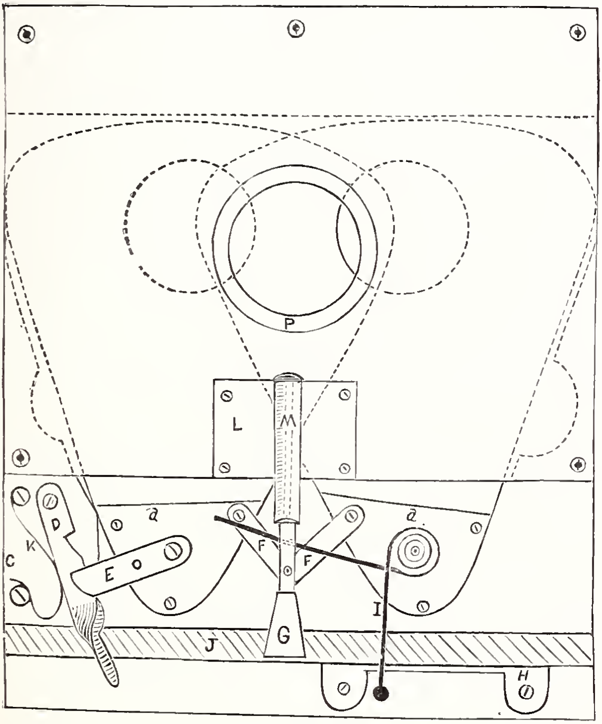


Fig 3.

front board, so that the releasing lever D may be firmly fastened in position. The spring K keeps the lever D pushed forward so as to take a good hold on wing lever E.

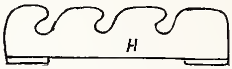
The lever D is made of one-eighth inch brass, as is also E, and should be put in position and the places for cutting notches accurately marked by setting the shutter "full open" and "fully closed" they may then be cut in with a file.

The lower end of Lever D is given a quarter turn so as to present a flat surface to the finger when releasing the shutter.

The piston G is tipped at the lower end with hard rubber for lightness and looks.

The screw that holds right hand wing in position is extended about $\frac{3}{4}$ inch to hold the shutter spring I and is topped by a thumb-nut.

The rack H is cut as shown in small diagram to give different speeds to the shutter.



The front board is grooved at J to receive the bottom of box so as to exclude light.

The upper part of shutter is covered by a one-eighth inch thick piece of bay-wood, and this is held away from the shutter by pieces of same wood B B B and is screwed down as shown in diagram No. 3, this cover board holds the cylinder M which is soldered to a piece of one-sixteenth inch brass L, and the board is turned to receive hood of lens at P.

The shutter is set by pressing the piston G up until the lever E engages with the lower notch of lever D, and is released by a pressure of the finger on the lever D.

The shutter is shown open, to focus, in diagram No. 1 and closed ready for an exposure in No. 2 and No. 3.

The shutter is not claimed to work in the one-thousand part of a second but will be found to make an exposure about as short as the average Photographer cares to develop, or may be made just quick enough to take a person walking, without a blur, which is rapid enough for ordinary work and will give better results than a very rapid exposure.

The speed may be regulated by the weight of the steel spring wire used and also by setting up in the rack H.

The first object taken to test this shutter was a horse trotting at a good road gait, and his feet were quite sharp.

I have no doubt but that the mechanical construction might be improved on but as the shutter answered my purpose I have not tried to improve it in any way.

E. F. Bacheller.

NOTES ON EIKONOGEN DEVELOPER.

From the very first time that I used this developer it seemed to me the only one, that I had had experience of, that was at all likely to prove a serious competitor with pyro, but

I must say that my first experiments led me to doubt very much whether it would. I will confess, however, that the fault lay, at least in great measure, with myself rather than with the eikonogen, although the first samples that came out here were very inferior to the recent ones. Even at the present time I should be very sorry to part with my old friend pyro; but there are some purposes for which I certainly prefer eikonogen and regularly use it. They may, I think, be summed up in portraiture and instantaneous work. For ordinary landscape work, where we are pretty sure that the exposure is sufficient, but are by no means sure that it may not be too great, I think pyro is still beyond comparison the best developer, as it gives the greatest latitude. I have practically found no convenient way of developing with eikonogen when the exposure is too great, although some such way may be found through time. Eikonogen will prove very much more expensive than any other developer commonly in use, unless several plates are developed with the same solution. Now, the doing of this prevents the possibility of beginning with only a very little alkali, as we do when using pyro, if we are doubtful of our exposure. It is true that we might use the two solution method if we were developing a number of plates at a time, but this method is scarcely applicable to anything much under a dozen exposed plates.

I am beginning with all the bad that I can say of eikonogen, so that the good may come the better afterwards, and I therefore now state what I consider to be its most serious drawback. This is its uncertain keeping qualities even when in the original bottles unopened. The first eikonogen in tin cases had simply wretched keeping qualities. The so called "white crystals" in bottles keep much better, but by no means perfectly. Of about one hundred bottles that have passed through my hands since the new eikonogen first came out here, the contents of four were quite black when they arrived, and the contents of some other four have turned black during the two two months or so that they have been in the country, whilst there is not a single one of the bottles, at the present time, that has not a certain percentage of the crystals turned black.

On the other hand, it has to be admitted that, unless the stuff has actually turned quite black, it works as well, or nearly as well, as when it is as nearly white as ever it is, that is to say when it is a sort of yellow prussiate of potash color.

Eikonogen shows its advantages in the case of some plates much more than in the case of others, but so far, working

with the new eikonogen, in good condition, I have found no brand of plates with which it would not allow of as short an exposure as could be given with the best pyro developer, whilst with most a distinct reduction of exposure is permissible, and with some a reduction almost to one-half of that needed with any other developer. It is unnecessary to enlarge on the great benefit of such properties. The facts that the color of image got is excellent, and that there is no staining of hands or anything else are, I think, of less importance—although by no means to be disregarded.

A thing that I think I have scarcely seen mentioned in connection with eikonogen developer, is the great difference that there is between the progress of its action and that of pyro.

With a pyro developer, if exposure and everything else has been right, we should get the detail that we want in the shadows, and the density that we want in the high lights, in about the same length of time. If our density is coming up with relatively undue rapidity, we add alkali; if the detail is coming out too soon with relation to the density we add a restrainer.

With eikonogen, at any rate as it is generally recommended to use it, things are quite different. The action is more like the development of a wet plate. Very soon after the developer has been flowed over the plate, all the detail that is to be got appears. No addition of alkali will bring out more, although the application of a more concentrated solution of eikonogen may bring out a little more. At this stage, however, the image, although rich in detail, is a mere ghost as regards density. It is necessary to continue the action for several times as long as has been sufficient to bring out all the detail, to get the necessary density, and it is to be noted that this must be apparently somewhat more than would be sufficient with pyro, otherwise the prints from the negative will be flat. This is on account of the total absence of a brownish, or greenish tint that there always is in pyro developed negatives.

The process, in fact, somewhat resembles the development and the after re-development, or intensification, of a wet-plate negative.

In conclusion let me say that the color got with eikonogen, on very slow gelatino-bromide plate is, I consider, finer for transparencies, than that got by any other developer.

W. K. Burton.

Negative by R. Eickmeyer, Jr., Yonkers, N. Y. Kurtz Process.

ATTRACTION.

Negative by R. Eickmeyer, Jr., Yonkers, N. Y.

Kurtz Process.

TEMPTATION

Negative by R. Eickmeyer, Jr., Yonkers, N. Y.

SATISFACTION

Kurtz Process.

ATTRACTION—TEMPTATION—SATISFACTION.

A few years ago a friend of mine, much in need of rest and recreation, began looking about for a place where he might, during his leisure hours, devote himself to his hobbies; for he is an enthusiastic fisherman and an expert with the gun.

Barnegat Bay on the Jersey Coast he finally selected for his camping ground. Here on an island, five miles from the main land and a mile from the ocean, in the deep grass, he built a rude house and gave to it the tint of the sedge as we find it in the Fall, so that it would not be looked at suspiciously by the thousands of waterfowl that throng the bay on their long journey to the South in that season of the year.

No one but a devoted lover of nature would be tempted to a spot so forlorn and deserted. Nevertheless I do not know where I have experienced such pleasurable sensations as here, when after a cold wet day of shooting followed by a supper cooked by old John, I have sunk out of sight in one of the deep feather beds and have caught a glimpse, through the little window, of Barnegat Light and its long fiery tail in the water, to be rocked to sleep by the howling wind sweeping round the hut with fearful violence as if to make it fall like the house in the parable that was built on the sand.

The time these pictures were taken we were down after snipe.

As we sailed to the beach that morning Barnegat Light to the "southard" still loomed up brilliantly; the air was raw and the wind blowing stiffly carried to us the sound of the surf a mile away.

Our early efforts were rewarded by a liberal bag of snipe which "stooled" to our decoys beautifully.

It was after the sun had risen and there was a lull in the shooting and we sat in the "blind," watching the huge waves break almost at our feet, that the thought of photographing the scene occurred to us.

One suggestion followed another until, finally, after a great deal of fun, the series of pictures was completed.

The romantic surroundings and my friend's enthusiasm for photography made him so far forget himself as to pose as the "city sport." In "Attraction" we see him coming down the beach with a light and buoyant step. One look at "Temptation," the desperate expression of the face and the poor little snipe at the end of the gun prepare one for what we see in "Satisfaction:" every snipe bought and the gunner counting

his money carefully while the dude hurries away to give the boys at the club a snipe dinner while he regales them with stories of the "big day" he had at Barnegat Bay.

R. Eickemeyer, Jr.

HYDROQUINOL DEVELOPMENT.

When hydroquinol was hailed as the "developer of the future," it was not imagined that the near future was to be so prolific in new developers as has proved to be the fact. Incontinently they came, thick and fast, and one after the other was greedily taken up by the multitude who, having been induced to "press the button," were apparently desirous of finding an equally easy way to "do the rest." Captivated by an unwonted success in bringing out the image impressed upon their plates, they were too ready to rush into print and fill the journals with their praises. It is an unfortunate fact that those most ready to grasp for new remedies, as well as for new developers, are the practitioners who have the least skill or knowledge in the use of those which long use and experience has established.

Undoubtedly conservatism may be carried too far, and men may become so wedded to their own methods, which they have learned by long practice to work with skill and success, as to decry all attempts by all others to seek for other ways and means to avoid the difficulties which may have cost them much pains to surmount. It has been said that all remedies are a choice between two evils, inasmuch as the medicine which accomplishes one object perfectly may have some unpleasant after effect, and it is also true of all developers, that no one has yet been proposed which has all the desirable qualities, but surely that one which can be shown to combine the most of those required should be the one to assert its claim to be the "developer of the future." We must not forget, however, that the future must be judged by the past, even in photography, and that new processes may be discovered which will not need any developer at all. We once had a perfect developer, or as near it as may be, in the iron developer of the wet collodion process, but both are now nearly numbered among the things that were.

But we are not now "looking backward." To decide upon the comparative merits of the many developers now claiming attention, it is necessary to consider the points essential to ensure a popularity which may be lasting.

First.—It must be harmless; *e. g.*: cyanide potass. could not hold its own *vs.* hypo, for general use, though superior to it in many points as a fixing agent.

Second.—It must be cheap and economical in use, and this includes stability in stock solution, and necessarily, cleanliness in working.

Third.—It must be certain in action, bringing out only the effects of light in proportionate gradation, and not "fog" or stain, or act injuriously on the film or its support.

Fourth.—It must be easily controlled or modified in its action to allow for over- or under-exposure, or to ensure proper printing density in all parts.

Fifth.—It should be reasonably rapid.

It will be noticed that I put this quality the last, as extreme rapidity is not in my opinion a desideratum. Extreme rapidity is not, as many seem to suppose, an evidence of great energy as a reducing agent, for many proposed developers flash out an image instantly, but fail utterly to give it printing density without further treatment by intensifying, so called.

If any of the above named essentials should be placed at the head of the list, it would be the one I have placed the third, or under the third—the quality of reducing, or making visible *only the molecular changes produced by actinism, or light-ray power, and ignoring, so to speak, the provocatives of "chemical fog."* Hydroquinol properly compounded as a developer has this remarkable quality in an eminent degree. It is also apparent in eikonogen.

And now I will again urge those who may kindly read this article to give the hydroquinol developer—which just now seems to have been distanced in the race for popular favor by the more rapid eikonogen—a fair trial. Repeated and most careful comparative trials against others have more firmly convinced me that hydroquinol combines more of the qualities to be looked for in an ideal developer than any other thus far proposed.

I claim that it is harmless, absolutely free from any injurious or poisonous or irritant effect upon the user. It is as cheap as any, and as economical in use, and is infinitely more stable in mixture than pyro or eikonogen. I have kept the stock solution of quinol and sulphite without any acid, in a half filled, glass-stoppered bottle, without especial care except from exposure to light, for more than eight months, and found it upon trial to be unimpaired in developing power, the solution being clear and limpid, changed only to a light straw color.

I have succeeded in keeping pyro with acid sulphite nearly as long and well, but have not been able to keep eikonogen, either in solution or substance without deterioration for more than half as many weeks.

The quinol developer will not stain fingers or linen : I have repeatedly spilled it upon shirt bosom and cuffs, which show no signs of stain after return from the laundry. It is certain in action and will bring out only the impressions of light, even the faintest, and has, above others, that *selective* affinity which disregards such influences as result, with other developers, in fog or stains. It can easily be controlled or modified by simple dilution with pure water or used developer, and lastly it is reasonably rapid, and can be made as rapid as desired by the addition of a few drops of a solution of caustic soda. I fear that I have already trespassed on the limits of my space, and will close by repeating the formula which I have found the best:

No. 1. Sulphite soda............ . ...240 grains
Pure water.. . ...4 ounces

dissolve and filter, then add

Hydroquinone....................................60 grains

No. 2. Soda carb. (washing soda).............a saturated solution

To develop a 5x8 plate take two drams of each No. 1 and No. 2 with water to make four ounces.

The sulphite must be pure crystals, and every tiny crystal of the quinol must be dissolved. No acid is required in the stock solutions, as they only tend to slow the action if added.

Joseph B. Brown, U. S. Army.

DEVELOPERS AND DEVELOPING.

The modern photographer uses altogether too much sal soda in his developer. I find that two-thirds less sal soda than sulphite, or about one grain of sal soda to three grains of sulphite to the ounce is the best preparation for mixing the sodas.

Most of us also use too much pyro. To four ounces of the soda solution described above I use only one dram of pyro solution, composed by dissolving one ounce of pyro in sixteen ounces of water. Pyro should never be used any stronger than that; for after all, it is not the pyro that develops, but the soda. Pyro gives density. The more pyro one uses, the more contrast, of

course, is obtained in the negative. Too much pyro fills up the shadows and destroys gradation and softness.

The best way to use developers is invariably to begin with weak solutions. Especially is this true in developing an instantaneously-exposed plate. Start with a developer weak in pyro, and add the pyro as development progresses. If you are using one dram of pyro solution, ordinarily, start with half a dram, and keep the other half dram to add to it as occasion may require. Do not add the pyro to the solution on the plate, but pour that off into another graduate and add the pyro there.

Ammonia is an excellent alkali in connection with pyro, but it is rather unreliable because of its great instability. You can never get it of the same strength twice from the same bottle. On removing the stopper but once, enough moisture is taken from the air to weaken it considerably. One drop to the ounce of developer from a strong solution of ammonia is all that is necessary, and with it you will never produce green fog. As the ammonia grows weaker, of course you have to increase the amount; and right here is where one's judgment comes in. Ammonia is good if you know how to use it. If not, you would better leave it alone.

Eikonogen developer gives a false intensity. You have to carry your negatives further than you would if pyro were being used, and then you do not seem to get so good printing qualities. There is a deception in the negative. A density that appears sufficient and that would make a good print if pyro had been used, results in making a poor, flat print when the eikonogen has been employed. The eikonogen-produced density does not seem to have the same retarding power in printing. The pyro-formed image retards printing, so that a brilliant result is produced. Eikonogen also produces a density that is false in color. And this perhaps accounts for its deception. With pyro, you carry the negative as far as you want it, and then stop, and you are sure of having a good printer. With eikonogen, you have to carry your negative further than you really want it, in order to get sufficient density.

With any developer, always start with a solution weak in alkali, and increase its strength as development progresses. I have been a practical photographer for more than a quarter of a century, and this is the result of my experience with developers.

James L. Forbes.

BLACK VIGNETTES.

I HAD no end of trouble for a long time trying to make black vignettes, but the black would not come out black. I tried several different pieces of felt for background, each sample warranted black, but all of them were more or less a blue black, and consequently, I failed to get clear glass in my negatives. Then I tried a vignetter in front of the lens, but with indifferent success. Finding none of these schemes would work satisfactorily every time, I finally tried putting the vignetter inside the camera, and found it worked to a charm, giving clear glass in my negative every time. The vignetter is easily made, and is well worth a trial. To make one proceed as follows.

Take a piece of black cardboard nearly the size of the bellows of your camera, in fact as large as you can pass through the back of camera, cut an oval hole in it and notch the edges all around. Cut a slit in each side of the cardboard nearly the whole length up and down. When done it will look like cut marked *A*, Fig. 1.

FIG. 1

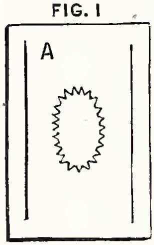


FIG. 2

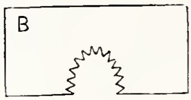
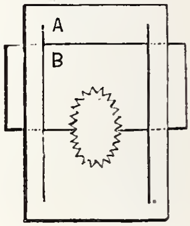


FIG. 3



Now make another piece like *B*, Fig. 2.

Then put *A* and *B* together by passing *B* through the slits in *A*, as shown in Fig. 3.

By moving *B* upward or downward you can cut off the figure of the sitter at any point, and by raising or lowering the camera you can vignette as close around the head as desired. All that is necessary now is to have a small square of black velvet, or a piece of dead black cloth for a background and you are all ready to make black vignettes.

To put the contrivance in the camera extend the bed so as to draw out the folds of the bellows, slightly curve the cardboard and slip it into the camera, placing it as near the ground glass as may be desired. The nearer it is to the ground glass

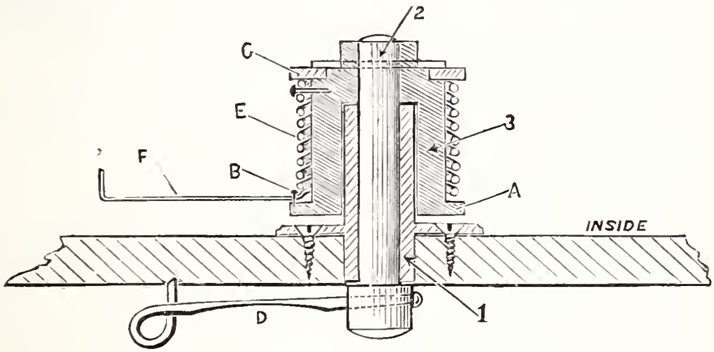
the closer the vignette, and the further away the more diffusion there will be.

In making black vignettes the sitter should be dressed in light clothing, and, in most cases, the hair may be powdered to advantage.

This idea may be old, but I have never seen it illustrated, or heard it described. I have used it for three years or more with success. *W. J. Hickmott.*

ACTUATING DEVICE FOR SHUTTERS.

The actuating mechanism of this shutter is really the principal part, as the "drop" may be either a sliding or a pivoted action. It is "instantaneous" in several degrees, and may be worked by hand for time exposure; it is particularly applicable for shutters of small size such as are required for detective cameras.



Reference to the drawing in section will aid the description. A brass tube (1) is suitably secured in the side of the box, to provide a firm bearing for the steel spindle (2) which has pinned to its inner end the sleeve (3) which slips over the tube (1) without contact, and has at its free end a wide flange *a* with a stud *b* set on the upper side near the edge. Upon the attached end of the sleeve a washer *c* is placed thus forming a sort of spool, to be revolved by a lever *d* in the head of the spindle, (2). On this spool is placed a spiral spring *e* made of piano wire, one end of the spring being firmly fastened to the spool, while the other end is left straight and entends at a right angle with the axis of the spring, spool, spindle, etc. This extended end *f* is hooked through a hole or slot in the drop, and serves

to set and to operate the same by means of the lever, the spindle and the spool.

Here is the philosophy of it:—The free end of the spring being attached to the "drop," we revolve the spool in the proper direction; the stud *b* on the lower flange prevents the spring unwinding thereby causing the extended end *f* to act rigidly by which the drop is drawn, it being then caught by an independent arrangement. Then we revolve the spool in the opposite direction and thereby wind the spring to any desired tension. The first act sets the shutter, the second applies the desired tension; then "press the button" and act III. is accomplished. For time work, perform act I. slowly according to the exposure desired. *C. D. Cheney.*

INSCRIPTIONS ON NEGATIVES.

It is desirable, and especially so with negatives of scientific subjects, to inscribe upon them either before or after development the name of the object photographed, and the conditions under which the negative has been made, and to fix these marks permanently and printably upon the plate.

My astronomical and spectrum photographs are all provided with name, date, remarks on the kind of plate, development, time of exposure, and also with a copy of my own autograph. It is done in the following very simple manner.

Mechanical injuries to the light-sensitive plate, like accidental scratches, become visible after development; on which principle I have applied my method of marking negatives. It was published superficially a few years ago, but I will here describe it in detail.

With a very highly polished, fine, but not excessively sharp steel point, the letters are written upon the plate, pressing down the point but slightly. To do this in the dark well and accurately, and to manipulate upon the selected spot securely, and without injury to a perhaps very valuable negative, I cut patterns from very stout card-board, one for each of the different sizes of plates used. They are fitted nicely into a frame, exactly of the dimension of the plate, and covered with a thinner card-board, provided with openings on corresponding places. The exposed plate is then laid in the frame, film side towards the opening, and through it the inscription made. Quite an easy manipulation. A small negative copy of my own autograph attached to the dark-room lantern is then exposed upon the plate, which is then developed. After

developing, the written characters and all appear neatly upon the plate, and especially so when the writing has been done by sufficiently pressing the steel point upon the film.

Astronomical photographs can thus be marked with orientation lines, to observe, for example, the daily motion of celestial bodies, for which purpose peculiarly formed frames have been constructed, well fitting the precision holders of my apparatus. To cut lines correctly into the film, a corresponding brass rule is attached to the frame, and its proper position controlled and eventually corrected by making trial photographs of star paths.

Stars near to the equator I photograph with an immovable telescope, when the lines representing the daily motion of stars are obtained, cut into the film, and then developed. Any deviation occurring between the lines is determined by measurement. Eventual errors may be corrected by displacing the ruler, or by calculation. As my astronomic camera has an ocular with spider web, photographic correction is but occasionally made.

The inscriptions are, however, extremely fine, and do not print with desirable distinctness. It is better, therefore, to cut deeper after the gelatine film is dry in order to obtain perfect prints of them.

A transparent ground, as in spectrum photographs, prints black. By cutting deeper into the gelatine and then rubbing in pulverized graphite, the lettering will appear white upon the black ground. But with perfectly opaque grounds, it is best to cut the gelatine down to the glass support, when the prints will show black letters upon white.

But when the inscription must be read before development, I write in large characters with a soft pencil upon gummed paper and attach it to the glass side of the plate. When traveling I keep records of subjects taken, time of exposure, etc., in that manner.

Eugene von Gotthard.

VENTILATING THE DARK-ROOM.

We all know what it is to have a Turkish bath while developing a plate in a small room, and to the many amateurs that have poor lights and no ventilation in their dark-rooms, I wish to say:

First, make a good window in the side of your dark-room, so that you can place a lamp outside and not have the heat in the

dark-room. My light is a 16x20 ground glass, covered with two pieces of paper, colored with "Orange Diamond Dye," and from one to five pieces of tissue paper, as needed; it gives a splendid and safe light.

Then I have a very comfortable chair to sit in while developing.

Now for the ventilation of the dark-room; make, or have some one make for you, a small "bellows" (the same as blacksmiths use) say, about twelve by twenty inches, or smaller, if you wish it; have the nozzle at least one inch in diameter, screw two pieces of wood one inch thick, and one and a half inches wide, on the bottom of the bellows, one at each end, and have them long enough to extend past the sides of the bellows, so they can be nailed to the floor. Putting the wood strips on the bottom gives a free passage for the air to the valve (which must be on the bottom of the bellows). Place the bellows under your "sink" where it will be convenient to put your foot on; have the nozzle pass out through the side of the dark-room making a light-tight joint; fasten the bellows firmly to the floor, and attach a spiral spring to the bottom of the sink and the top of the bellows (a pair of strong suspenders will do in place of the spring), so that it will keep the bellows open.

Now you must make a place for a free passage of air *into* the dark-room, near the top of the room, and make it so that light cannot get in. An easy way is to get a piece of hose, say, one inch in diameter, about three feet long, make a hole in the wall or roof of dark-room just large enough so that the hose will fit tight in, put one end of the hose through, and then tie a loose knot in the end inside of the dark-room.

When developing a plate, put your foot on the bellows, press down, and out goes the air; raise your foot and up comes the bellows ready for use, and by working with your foot you can have just as much fresh air as you want.

George G. Bruce.

THE WASHING OF NEGATIVE PLATES.

A TROUGH with vertical grooves, or other vessel so constructed that water may flow continuously in and off at the same ratio; or changing of the wash water in regular intervals, are the methods most generally adopted for the washing of plates. It is, however, not well understood how washing

to perfection is attained by either of these methods, and we will explain in the following the fundamental differences existing in the two.

If we take a vessel filled with Q liters of water and place in it a plate carrying V grams of sodium hyposulphite, or any other soluble substance, that is to be removed by washing, the concentration of the solution will be $= \frac{V}{Q}$. Were we to allow $\frac{1}{n}$ of the contents of the vessel to run off, and to replace it immediately afterwards with the same quantity of pure water, the amount of salt contained in the solution would be changed from V, to $V\ (1 - \frac{1}{n})$, and the concentration of the solution be finally $\frac{V}{Q}\ (1 - \frac{1}{n})$. By repeating the procedure a second, a third or ten times the salt contained would be successively diminished to $V\ (1 - \frac{1}{n})^2$, $V\ (1 - \frac{1}{n})^3$, $V\ (1 - \frac{1}{n})^4$, and the concentration of the solution be $\frac{V}{Q}\ (1 - \frac{1}{n})^2$, $\frac{V}{Q}\ (1 - \frac{1}{n})^3$, and $\frac{V}{Q}\ (1 - \frac{1}{n})^{10}$.

Were we, in correspondence with the first method of washing, to allow a very small portion of the liquid, say one one-hundredth part to flow off, and the same quantity of pure water to flow on again, and were we to examine into the now reduced state of concentration after the whole contents Q have been once, twice, or ten times changed, the result would be

$$\frac{V}{Q}\ (1 - \frac{1}{100}) \quad = .367$$
$$\frac{V}{Q}\ (1 - \frac{1}{100})^2 = .134$$
$$\frac{V}{Q}\ (1 - \frac{1}{100})^{\ 0} = .00004$$

The contents of the vessel ten times renewed would show a concentration of the solution of $\frac{4}{100000}$, still strong enough tc detect the substance dissolved.

But by adopting another method, for example, were we to allow $\frac{99}{100}$ of the whole solution to run off, and replace it by the same quantity of pure water, when, as before, the vessel were ten times emptied and refilled with the same quantity of water the concentration of the solution would be after the first emptying $\frac{V}{Q}\ (1 - \frac{99}{100})$ after the second $\frac{V}{Q}\ (1 - \frac{99}{100})^2$, etc., and after the tenth $\frac{V}{Q}\ (1 - \frac{99}{100})^{10}$, or 0.01, 0.0001, 0.000, 000, 000, 000, 000, 000, 01; so imperceptibly dilute that even the spectroscope would fail to indicate the substance dissolved.

We must conclude, therefore, that a complete removing of the contents of the vessel, and a repeated renewal of fresh water, is by far the most expeditious and economical method of washing.

The waste of water occasioned by washing in troughs and running water is useless. It retards the progress of the work. Water ten times renewed acts with much better success than water running for a night.

Still more to the point would be a third method, the outcome of the above observations, namely, a direct rinsing of the plate with ten litres of water, without allowing any quantity of it to stand still for a moment, for all that has been dissolved would then be at once washed away, a process easily executed by passing a flat stream of water over the whole plate when resting in an inclined position.

Experiments have proved the efficiency of washing plates by rinsing; with it every trace of fixing soda is totally removed. Certainly a considerable gain of time and saving of much water. *Chevalier A. von Loehr.*

CARBON PRINTING.

There can be no question but that prints from most negatives could be greatly enhanced in artistic value if there were more colors available in order to print in harmony with the subject. The silver, iron, platinum or uranium processes, singly or collectively, do not wholly fill this want, and we shall, sooner or later, have to adopt something more satisfactory. And why not carbon—it has everything in its favor, cleanliness, simplicity, time-saving, range of color and universal application. Carbon tissue can be made in any color, and doubtless when the process becomes more popular we shall have twenty different tints to select from. At present there are only about six colors of tissue to be had.

Who has not admired those red and sepia reproductions of paintings published as "Braun's autotypes?" They are nothing more than carbons, and not in the least difficult to make. The same things in albumen silver prints might not command passing notice. Perhaps that is because we are tired of the black and purple prints we make, but I think it is really because the reds, sepias and warm blacks of the carbon process are more artistic and represent the subject more in harmony with nature. Carbon printing has been in steady use in other countries for many years, and I think would have been popular here had it been possible to obtain the necessary materials, but, for some inexplicable reason, it has been very little spoken of or used outside of process-working, and stock dealers generally have not carried the materials for carbon working.

One New York firm has just taken it up, and advertises a complete line of supplies, and gives instruction, and others will follow, no doubt, ere long. The very fact that to make a carbon print requires no toning, fuming, fixing or dark-room work, only hot water, will have its effect on the amateur. It is irresistible. Another and a very important advantage is that carbon does away with such a bewildering array of different processes, and their attendant expense. Carbon will do all that can be done. Transparencies, slides, opals, the high finish of an aristo, the flat finish of a platinum or bromide, all in any color you choose can be had from carbon. In fact, this one process will do more and better work than the average amateur can accomplish with a roomful of all the other materials made. The reason is that you are always working the *one process*, and attain great proficiency in it, which could not be accomplished if constantly changing from one process to another.

So much for what the process will do. Now, how to do it. The tissue is sold in large sheets, which should be cut to the size you use and sensitized the night before using. To sensitize the tissue it is only necessary to immerse the needed number of sheets in a tray containing the sensitizer and let them soak three minutes, after which they are removed to glass or rubber plates and the surplus fluid squeegeed off, then removed from the glass and hung up to dry. In about four hours they will be dry and ready to print. The negatives must be bordered with black paper (slide binders do nicely) to give a safe edge, that is, a border all around the print that shall not be acted on by light. Printing is judged either by making a small silver print and timing it, or by using a photometer; two to five minutes in the sun generally suffice. The print having been made, all that remains is to soak it to limpness, squeegee it onto a wet sheet of transfer paper and pour hot water upon it. The backing can then be removed and by gentle rocking all the soluble pigment is soon washed off, leaving the print clear and brilliant; then a slight washing and it is hung to dry. It may afterwards be transferred to glass, opal or paper, or may be kept on the first paper.

This process is the result of Poitevin's discovery that the action of the sun's rays upon bichromated gelatine is to render it insoluble. By mixing pigment with his gelatine he obtained permanent prints. The applications that are possible with this process can readily be imagined, and if the advantages I have mentioned induce any strangers to the process to investigate, I feel certain they will be delighted with it.

Edward W. Newcomb.

THREE PRACTICAL HINTS.

1. *Backing Plates.*—Since I first tried the following method the use of "backed" plates has become with me the rule instead of the exception. Buy some Burnt Umber (a common paint, sold as a brown powder at a few cents per ounce), and mix two ounces of it in a saucer with a table-spoonful of good gum, and as much methylated spirit (wood alcohol) as will make the whole into a stiff cream or thin paste.

In the dark-room apply this brown mixture to the back of the plates by the aid of a piece of wash-leather. It is best to tie a little cotton-wool inside the wash-leather as it then makes a nice round pad. Begin in the centre of the plate and rub on thickly and quickly. It is better not to go right up to the edges—leave, say half an inch clear all round. Lay this backed plate down on a piece of red blotting-paper while you work on a second, and by the time half-a-dozen plates are coated the first one will be dry and ready to insert in the dark-slide. A piece of red blotting-paper may be laid upon the back of each plate after inserting it in the slide, in order to keep all clean. After exposure and before development, remove the backing by means of a damp sponge; it comes off quite easily. The advantages of "backed" plates are great. Halation is subdued or prevented; there is considerable increase of brilliancy; more latitude in exposure, and greater ease in development. The extra trouble and the extra cost are but small. Do not think that the same end can be obtained by laying pieces of black velvet or black paper upon the back of the plates. *Optical contact* is absolutely necessary; and this can only be obtained by the use of some fluid at some stage or other of the operation.

2. *Printing under Green Glass.*—Do you long for rich black tones on your silver prints? If so lay a piece of green glass over your printing-frames, and use the following toning bath:

Distilled water	10 ounces
Borax	60 grains
Chloride of gold	1 grain
Uranium nitrate	4 grains

The prints will take much longer to print under the green glass—perhaps twenty times as long as without it—but the difference in the tone which it produces must be seen to be believed. With matt surface paper a black tint resembling that of platinotype can be obtained.

3. *Use Covers for your Developing Dishes.*—It is now some six years since I strongly recommended the use of a cover to each developing dish; and I now repeat the recommendation. They are more wanted now than they were then. The continual tendency is to increase the speed of plates, and rapid plates are most certainly affected by long exposure to even the "safest" red or yellow light. It has become a general practice, also, to develop slowly and tentatively; and many amateurs spend at least half-an-hour over the development of each plate. The continued exposure of the plate to the light of the dark-room lamp for this period is certain to produce surface fog, if not worse effects. Even a sheet of stiff cardboard rather larger than the developing dish makes a very effective cover; the lids of plate-boxes make good covers for small dishes; but it is to be wished that dealers would stock light metal covers, painted red and provided with a handle. When the developing dish is properly covered the gas or oil lamp can be turned-up, and other work proceeded with. With the aid of a proper "cover" the dark-room need no longer be a prison, but—the cover being slipped on—the door may be opened, and entrance or exit freely afforded. Covers for all dishes are useful, for they exclude dust and dirt. When not required they can be suspended by a nail against the wall, and take up practically no room.

W. Jerome Harrison, F.G.S.

A PLEA FOR IMPERFECTION.

We make photographs too well. This may seem a startling statement, in face of the chilly glacier of unsatisfactory work which goes, augmented year by year, slowly crawling down the valley of discontent into the sea of oblivion. But it is the fact that of the innumerable men who can make excellent photographs, there are very few who succeed in at the same time making pictures.

The modern ideal seems to be a technical one. In every exhibition one sees scores of beautifully developed, printed, and toned exhibits, mechanically perfect, clean, sharp, glossy. One can count every leaf on each tree, every shingle on the roof, every stone in the road, every hair on the dog. Landscape is reduced to a scientific diagram, and beauty brought down to miscroscopic analysis. As Whistler says: "The dignity of the mountain is lost in distinctness; but the joy of the

tourist is to recognise the traveler on the top." But the prints are pronounced remarkable, superb, "as good as any professional could make them."

Now there is no rationality in this. The amateur is not working from a commercial standpoint. He is in it for pleasure, and is not bound down to any mercantile standard of mechanical excellence, but can experiment. There is the type, and he is a useful one, whose point of view is scientific, and who is more concerned about new formulæ for developer and novel actions in cameras than he is about making a picture which will please. He is a chemist or a mechanician, and does not care about the artistic possibilities of his instrument. But there are others to whom the realms of pleasure on the other side of the line are partly open. Why should they cross over into the technicians' territory, and adopt the standard of the shop? They are not bound down to satisfy the conception of the gentleman who said: "See what a superb photograph that is of my dogs! You can count every curl on 'em—and you can read my name on their collars."

The brush and the pencil are amiable wanderers, only too vague in our trembling hands. But the camera is an instrument of precision with an inclusive grasp. Its tendency is to give you a lot for your money; and if it is not judiciously repressed, it will make the summer woods look like one bewildering scatterment of detailed leaves, and will reproduce the peachy cheek with the texture of cork and the speckles of the sparrow's breast. It is too powerful for picture-making at its full force, for there must be a little mystery about art; its forte is really, when the perfected lens is focused mercilessly and stopped down, the scientific diagram, not the artistic picture. Its tremendous truthfulness is exceedingly valuable in its way, but it must be a trifle tempered where some trace of pleasantness as well is desired.

Focus is perhaps the main point—this including the abuse of small stops. Many a picture would have been a very pleasing thing to look at—composition, lighting, subject, all good —if the fiend at the photographer's elbow had not suggested an extra turn towards accuracy of the focusing screw, and then slipped the smallest stop into his hand to complete the ruin. The ideal position of the lens is about that where a good hand-camera worker usually carries his—at neither extreme, where there is the maximum of depth, with nothing too sharp at any one plane of the field.

Negative by Harry Platt, Nantucket, Mass. Electro-Light Eng. Co., N. Y.

"SAILING THE HIGH SEAS OVER."

The old rule of "never photograph against the sun," every worker with artistic instincts must have long ago transgressed. The most superb effects are secured very often by so doing.

Rules in general are good things to break through when one can see a picture on the other side of them. And if the clever photographer, led by taste, goes on experimenting, he will find in the end that old enemies will sometimes turn towards him the face of a beneficent friend in the most unexpected and surprising way. So that he will find aid to pictures in under- and over-exposure; and even the old arch-destoyer, fog, will sometimes in careful hands help to create a picture where one could not have been without him.

Frederic Hart Wilson.

A BROKEN NEGATIVE.

On opening a box of exposed plates I found the top one cracked nearly across; my first impulse was to throw it away as useless, but I concluded to develop it as a guide as the rest were exposed the same day and under much the same conditions. On development it proved to be a good negative and was fixed and washed with the rest. After taking so much trouble it appeared hard to throw away a good negative without making an effort to save it; to do so I placed it in a rubber tray containing four ounces of water to which had been added about one drachm of sulphuric acid. The film soon commenced to frill, and with a little coaxing it came away from the broken glass. After washing the film in a few changes of water to remove the acid, a clean glass, a little larger than the original was placed in the water under the film. By taking hold of the glass and film by one edge and drawing them out of the water slowly at an angle of about 45 deg. the film will adhere closely to the glass; hold them in that position for a few moments to allow the water to drain off, then lay on a table, film side up, and draw the film into shape which can be readily done while it is wet; a little care is required at this stage, for if it dries unevenly the film will contract most where it has least hold on the glass; it must remain flat while drying.

My success in that direction induced me to try what could be done with a negative when the glass and film were both broken.

As an experiment I cut a negative with a diamond and broke the glass and film in two pieces fitting them together carefully; bound them with gum paper to a piece of clean glass of the same size as original negative then made a print in the shade, under tissue paper, which showed the reflection of the fracture plainly. To transfer the broken film I made a solution of plain gelatine in the proportion of twenty grains to the ounce of water, put the required amount of gelatine and cold water into a suitable vessel to withstand heat; when the gelatine swelled placed the vessel in hot water until the gelatine dissolved; when cooled to about 100 deg. warmed the broken plate to about the same temperature, leveled it and turned on as much gelatine as would remain on the film, being particularly careful to get it out to the edges where the breaks were. When dry, place in a saturated solution of alum for ten or fifteen minutes; after rinsing a few minutes in running water the film is ready for stripping. To do this take water eight ounces, hydrofluoric acid one dram; use a rubber tray for if you get the acid too strong it would strip the enamel from porcelain; when the film leaves the glass proceed as before. It is well to make an experiment or two with useless negatives to get your hand in; though it looks complicated in the description in practice it is simple and easy.

H. M. Grisdale.

LIGHTING THE DARK-ROOM.

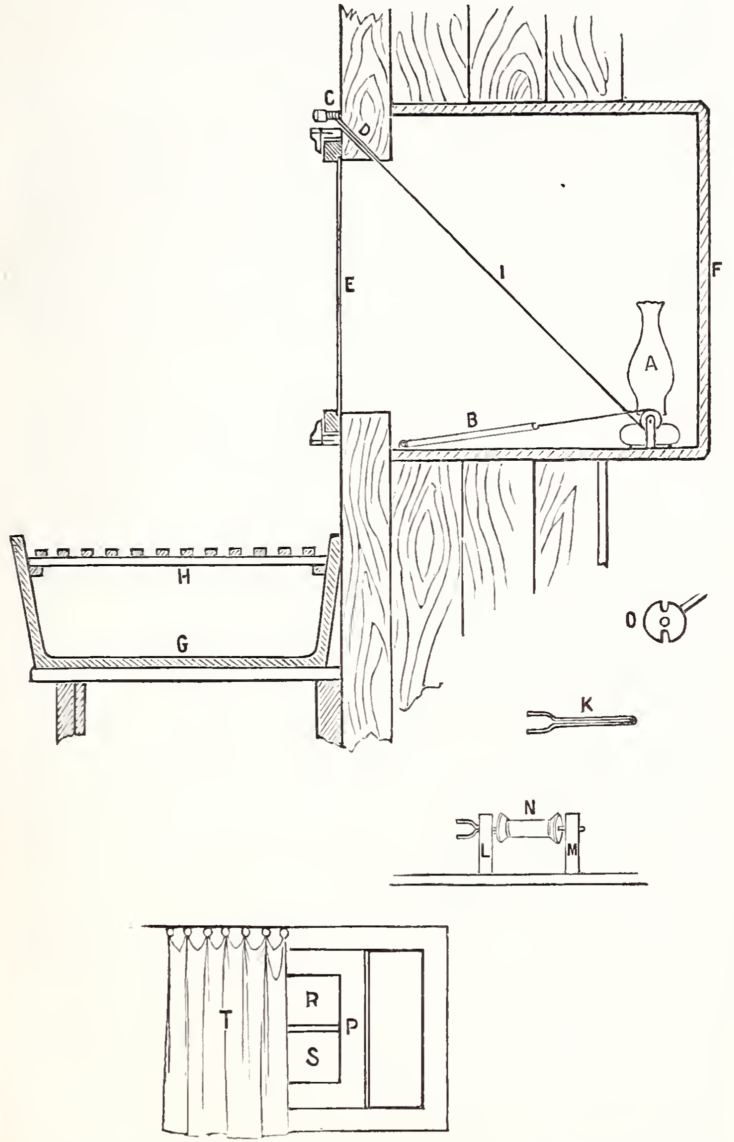
In spite of "Nuktigonia," "Cochinealia," "Analinia," &c., the time when the photographer shall cease to see through a ruby glass darkly, remains still in the misty distance. With each increment of sensitiveness we are more in the dark; and should orthochromatic plates come into general use, we shall develop the perfect plate in absolute darkness. But such a prospect is too somber to contemplate. To distract your attention therefrom, I will explain my method of "dissipating the superfluous illumination" in the dark-room.

The objects to be attained are:

1st. A light that shall not fog a sensitive plate on reasonable exposure to its rays.

2nd. That shall give enough light to work by.

3rd. That shall be controlled from the inside of the dark-room, while being itself on the outside thereof, thus not heating or vitiating the air of the dark-room.



A. Lamp. B. Rubber band. C. Knob for controlling lamp. D. Opening for the lamp cord. E. Colored glasses. F. Back of lamp box. G. Sink. H. Developing rack. I. Lamp cord. K. Wire clutch. L, M & N. Clutch mounting. O. Grooved milled head. P. Sliding sash. R. Clear glass. S. Tissue paper. T. Opaque curtain.

4th. That shall give some portion of clear glass for the examination of the partially developed negative.

We may take it as a first principle, that all light of whatever shade or degree is detrimental to sensitive plates; therefore change them in complete darkness. A little practice will enable this to be done quite readily, especially if it happens that the plates are packed in pairs. Do not, as is sometimes recommended, examine their surface for defects. Take them on faith.

The source of light is a hand-lamp with a No. 1 Sun burner, placed eighteen inches from the colored medium consisting of one thickness each of yellow and green glass, and preferably entirely outside the dark-room, so as to avoid heating this up.

Let the diagrams explain.

It will be seen that no direct light falls on the plate while developing, but as a further precaution two thicknesses of yellow tissue paper are pasted over the lower half of the glass, and a curtain sliding on a wire can at will completely obscure the same. The sash slides out of the way to admit of lighting or removing the lamp. This is also very convenient for making transparencies. There is a door in the back of the lamp box and also openings for ventilation.

The lamp is controlled in the following manner:—The milled head that moves the wick is notched as at O. A clutch K, of brass wire fitted as an axis in a cotton spool, is mounted as shown at L, M, N, at the proper height to engage the notched milled head. A strong rubber band is attached to the floor of the lamp box at one extremity, while to the other is secured a shoe-string or other inelastic cord I. This is passed several times around the spool N, thence through the opening D, to the knob C, around which a few turns are taken and the cord fastened.

When developing I use the light just at the top of the burner cone; to examine the negative, a little higher; during prolonged development, it may be turned almost entirely out. While clear glass without a diffusing medium is not a safe light, an entirely diffused one is very unsatisfactory. I think this arrangement obviates the disadvantages of bare glass while leaving it available for estimating density. What is a matter of guesswork with diffused light becomes thus a comparative certainty. The entire room is lighted so that it is *possible* to read a newspaper, but ordinarily I prefer to do my reading elsewhere.

T. E. Huston.

MORE MINOR MATTERS.

In an article entitled "Minor Matters," in the Annual for 1889, Mr. Lincoln Adams suggests that others might find their time well occupied in drawing attention to the smaller but still all-important details of photographic practice.

The average photographer is certainly very negligent in these apparently trifling matters, and requires continually reminding that it is absolutely necessary to exercise the greatest care in every particular, if he wishes to turn out the best work. Any vendor of merchandise, who thought his wares sufficiently advertised if he drew attention to them in only one issue of a newspaper, would be considered to be throwing his money away; it is only when an article is brought continually before the public gaze and forced upon it by the agency of advertisements, that this same public starts to think, "there is something in it." The same thing holds good in photography, and therefore the more frequently the "Minor Matters" are brought into prominence, the greater chance there is that the percentage of good results will be increased.

In the choice of an instrument the photographer will do well to take time and the advice of a more experienced friend, instead of at once purchasing whatever is offered, which is frequently the case; and in the choice of a subject he requires to be yet more careful.

Uniform success in this particular cannot be attained without experience, and the best manner of obtaining this experience is by close observation and comparison of anticipated with actual results, of the appearance of objects in nature and the same as rendered by photography.

We view a beautiful landscape, think "what a magnificent subject for a photograph" set up camera, expose, and develop, and are astonished when our negative, though developed carefully and with the greatest skill, proves to be as flat as a barn door. We discover too late that the charm of the natural scene lay in its color, and this color is the one item which our chemicals will not reproduce. A mental note is made, and from that time we are content to admire such subjects as this, and reserve our plates for something more suitable.

Another motto which is repeatedly overlooked, is the study of the subject so as to ascertain the time at which it looks its best. Many errors arise from inattention to this detail,

and in no class of work is this more noticeable than in the photographing of architecture.

To mention an extreme case: I have a photograph of a large public building in this city which can be satisfactorily photographed during about two weeks only in the year, and then it is properly lighted for only a few minutes each day; though dozens of photographs of this structure by different operators (some of them having taken medals in many parts of the world) are in existence, the print which has just been mentioned is the only one I have ever seen which shows that its position and architecture had been studied by the man behind the camera, and this man is not, I believe, a medal taker.

With the choice of plates this article has nothing to do, as every man has his pet brand, but whatever make is used, the plates should be carefully scanned before they are placed in the dark slides.

I had recently to reject no less than ten whole plates out of two dozen which were opened. These were of a favorite English brand—don't know how many medal pictures have been printed from negatives on plates of the same make—but this lot happened to be so full of holes, caused either by carelessness before packing, or by faulty packing, that it was found necessary to place the above number on one side, several having the holes so freely distributed that not even a perfect plate of a quarter size could be cut from them.

I returned four dozen of the same make unopened, as I had no doubt that they were similar. I imagine the feelings of an operator who exposed plates of this nature, without previous examination.

After a night journey it is my custom to dust the faces of any unexposed plates which may be in the slides. This I do previous to retiring for the night. The greatest care may be used in order to free slides from dust before changing, but this form of matter is so searching that it finds its way everywhere, and through the more minute cracks.

For changing all plates except "orthochromatics" there is no occasion to use a lantern; I have for years saved myself the trouble of carrying this article. Before retiring to rest the plate boxes, slides, etc., are laid upon the table, the candle is then placed upon the floor in such a position that its direct rays are shaded from the materials, and while having a glorious light to change by, I have never yet fogged the most sensitive

plates made. This method is used continually by many with whom I am acquainted, and they all speak highly of it.

In drawing the shutter previous to, and closing same after exposure, it will be found a wise plan to proceed as gently as possible in order to avoid disturbing any dust in the neighborhood of the plate, which might settle upon its face during exposure. All old hands will give the same advice upon this point; they know the splendid (?) effect sometimes produced on a wet collodion plate by the violent opening and closing of the shutter.

Make it a rule to give a liberal exposure short of greatly over-exposing. From my earliest experience with alkaline development I have held the opinion that there is no such thing as *mathematically correct exposure*, any more than that there is *one correct developer*, or that the constituents of the developer must be mixed in certain fixed proportions for all negatives. In order to produce good and uniform results, the exposure and development must go hand-in-hand, and both must be suited to the subject.

When changing plates do not forget to brand each with a number by which it may be subsequently identified; this number should be registered in the exposure book, and from the information in the column devoted to "remarks," the key to development will be obtained.

Do not allow laziness to get the better of you when washing the negative between the various operations after development, and whatever other operation be hurried, always give the fixing plenty of time. No use heaping blessings on a negative because it turns yellow after a few weeks of use, when five minutes longer in the hypo would have rendered it permanent.

Finally, if you wish to keep the faces of negatives in good order, coat them with collodion before printing. Plain collodion is cheap, and will go a long way towards preserving the film from silver stains when albumenized paper is used; any specially valuable negative from which many prints are required should be varnished in addition.

In the foregoing remarks there is nothing original, but that many workers omit the practice of several of the details mentioned, will be evident from even a superficial inspection of any average collection of photographic work.

J. H. Harvey.

OUT OF DOOR GROUPING.

Out of door grouping, to be successful, requires much study and more practice.

The result usually obtained by the itinerant photographer is calculated to drive an artist insane. The natural tendency of each member of a group is to get as near the centre of the picture as possible, stare straight into the lens and grin. Now unfortunately the average photographer lacks, in addition to his want of knowledge of art principles, the necessary "gumption" to tell a subject how ridiculous he is making himself. Hence, it is always best to explain, before anything else is attempted, that the object of the picture is not the individual, but the group collectively. Each member should feel that he, or she, must trust implicitly to the taste and experience of the photographer, and not venture to attempt individual posing.

Again, the operator must bear in mind that the combination is the end to be sought, and that however well a figure posed here, and two or three there, might look, by themselves, the result will prove a lamentable failure, if they do not harmonize. It is usually best for the photographer to pose the group without the assistance of others. A combination of ideas on the subject generally culminates in a combination of results, more startling than artistic. A suitable background is very hard to find when wanted. One of trees, with sunlight percolating through, is very tempting but usually very poor, the sunlight giving strong, hard lights, making the faces look black by contrast.

A good ground is a cliff or bluff, or a somewhat dense growth of foliage. The former usually admits of a greater variety of posing and offers the advantage of allowing those in the rear to show to equal advantage with those in the foreground. It is best not to have sky, or strong bright lights of any kind as a background, if they can be avoided, as the halation thus produced will generally mar an otherwise good picture. When it can be so placed, the camera should face the sun rather than have the subject to do so. Strong sunlight is a disadvantage in out-of-door portrait or group work. The subjects should be arranged in easy natural attitudes and the whole when possible divided into smaller groups, each of which is independent of the other, yet forming together a harmonious effect. Give each of the groups a line of thought and action which will impress itself on their minds and lead them not to think that they are being photographed, but

rather that they are acting a part. This feeling once impressed, the balance of the work is rendered much easier. As an instance, if it is desired to make a group of tennis players in costume with spectators and friends, arrange the principal performers towards the center, one, with the assistance of some others, explaining the method of using the racquet, a few in easy attitudes listening. To the right and left of the main group are some lolling on the grass, others seated on camp stools in appropriate positions. The immediate foreground supplied with various accessories of the game. The picture can in this way be easily composed in a pyramidal or other form, and while all have an easy, graceful pose, not one of the party needs stare at the lens. Explain to each his particular part in the tableau and impress the idea that upon each one is devolved the responsibility for the result. Endeavor to keep your subjects in sympathy with you, feeling the same desire to obtain a creditable picture that you have.

Robert E. M. Bain.

PORTRAITS OF CHILDREN.

To obtain pleasing portraits of children instead of mere photographs, is, like some other apparently difficult matters, very easy if you know just how to do it. And because the obtaining of pleasing pictures of these fascinating little subjects is much more desirable than the obtaining of mere photographs of them, I am inclined to think that a few brief notes from my practice and reading may prove helpful to this end.

Of course no photographer can expect to produce child studies of artistic merit without an understanding of the rules of Art. This would be as unreasonable as to expect to hear divine melodies from the lips of the dumb. I know that the study of Art, or any intimation of the necessity of an understanding of it, is irksome to the average photographer, but I am speaking rather to those who desire to produce the most perfect results within their power, and consequently are prepared to undertake the preparation needed by their particular study. How to become familiar with the broad principles of Art is such an oft-repeated story that I need not go into any detail here.

The next qualification to success in photographing children is the possession of an intimate knowledge of the little ones

themselves, that is, of children in general and of your subject in particular; the operator should be familiar with the ways and habits of thought peculiar to the little folks; he should be able to imitate their little tricks and enter into their whims; he should know also, how to please them and control them without the officious help of the numerous accompanying relations; and how to make them feel as much at home as possible whilst they are with him.

To secure the most beautiful effects the operator should be able to fix the time of sittings to suit the lighting of the studio, altho' in this matter due regard should be had to that time of day when the children are brightest.

At the time of sitting, as much light as possible without harmful reflection, should be admitted to the studio, abundance of pure white light being *sine qua non* in the photographing of children. As these subjects are generally dressed in light colored stuffs the surroundings and accessories should be in light tones also, so that harsh contrasts are avoided in the picture. At the same time care should be taken that the child receives the principal light, and that no other patches of light distract the eye when the composition is viewed as a whole. Select that portrait lens which, whilst giving you as much depth and roundness as possible, is rapid and allows the use of the widest aperture. I have always found it advantageous with children's pictures to over-expose a little, so that by restrained and weak development I could obtain thin detailful negatives, which gave charming prints in the hands of an intelligent printer. The time of exposure should rarely exceed 4 seconds, or be less than 2 seconds, in duration. Of course I am supposing that extra rapid plates are being used, when the difference of one second in exposure means a great deal more than it did in former days with slower plates. The development, as I hinted, should be gradual, but not too slow; there should be no forcing, and the negative before fixing should present a mass of grey and black forms with no sign of clear white upon it. As a guide to the density desirable I would say that the ideal negative, printed under tissue paper, should yield in a north light, without sun, at least ten prints in an ordinary printer's day.

In my practice I found that pictures produced after this simple manner not only gave satisfaction to those immediately concerned, but were in demand all the time for illustrative and artistic purposes, and particularly as the prettiest birthday or Christmas souvenir that any one could desire.

John A. Tennant.

A TOAST TO PHOTOGRAPHY.

The progress of photography, in keeping with the spirit and activity which characterizes the present age, has been marvelous, almost beyond conception. Its strides from the rude beginning of a few years back towards the attainment of a perfection, both technical and artistic, have been bold, rapid and unwavering. And, as a potent factor in the cultivation of the higher qualities and sentiments of mankind, it is fast securing recognition and approval. Like all other agencies which play an important part in the destiny of the human race, its development has been certain and its influence widespread.

How many persons pause, in their admiration of this art, to think what its present condition implies; to realize the enormous and unselfish labor involved in its advancement; to appreciate the constant devotion of its followers, in which identity and personal motives are laid aside; to grasp in its entirety an idea of the gap that it has filled and the void which would ensue were it to be lost to us forever; to trace its influence in the institutions of society; and to contemplate its possibilities.

It is not strange that photography should attract so large a number to its ranks. The means by which results are obtained appear so mysterious to the curious and uninitiated as to be well calculated to claim their attention. While the beauty to which it gives expression and the wide range it offers for the realization of individual ideas are sufficient to attract those who love art for art's sake.

To the impressionable, the dark-room with its soft weird light is like a sorcerer's chamber, and the secrets there exposed take on the semblance of witchcraft and the art becomes and remains enchanting, while the mood lasts.

To the ardent worker there comes a realizing sense of the genius of man. He studies with intense interest the process by which certain rays of light reproduce an image with an exactness and wondrous delicacy far beyond the power of the most gifted artist. And he acquires a rare appreciation of the lasting impressions which nature is thus induced to give us of her works.

Photography is at once dignified and fascinating. And, for a person at all susceptible to a sense of the beautiful, it possesses a charm which assumes the intensity of a magic spell.

In portraying the forms and features of loved ones; in recalling and preserving the most sacred memories of a life

which would otherwise lie buried in the oblivion of the past; in keeping alive and nourishing affections into a bond which the cruel separations of lands and seas cannot sunder; in the cheerfulness it infuses, the sympathies it engenders, and the solace it extends, in the homes of rich and poor alike; it has performed a kindly office which entitles it to the heartfelt thanks of a grateful people.

The almost infinite capabilities of photography, and the peculiar and reverent interest with which it clothes the study of nature in all her types and moods, bespeak for this noble art a devotion that shall not smoulder. And with the ascendancy of the finer feelings that influence and control the human passions, must go, hand in hand, an ever-increasing appreciation of the gratitude which mankind owes to this science and its devotees. *William H. Baker.*

DARK ROOMS.

If in a multitude of counselors there is safety, photographers ought to be very safe, for there is almost unlimited information concerning camera work to be met with on every hand, and, among the countless subjects discussed perhaps none is more important than the dark-room and its use.

To begin with lighting the room, some authorities range themselves on the side of almost Cimmerian darkness and from that, through all possible gradations to nearly daylight, are found scores of camerists each firm in his own belief. The beginner is bewildered at being told by one writer to use only dark ruby light, by another ruby and orange, etc. It is an important point, as it affects one's eyesight, and I believe in having the room just as light as possible consistently with safety to the plates. My own room has a large south window, and after at different times trying several lamps and a ruby chimney on the gas jet, I abandoned them all for a double thickness of ruby and orange fabric over the glass, renewed as it grows faded. Since then I have not fogged a plate. Under the old state of things I had nearly ruined my eyes by insufficient light, to say nothing of constant accidents in the way of cuts, spilled developer and breakage of all kinds. In my room, as at present constituted, I can easily see to read newspaper print at the farthest point from the light, and work quickly and safely, not being liable to mistake one bottle for another, as once, when I caught up hastily what was thought to be

bromide, but proved, too soon, to be acetic acid. Of course, I begin development far away from the light and handle the undeveloped plates with my back to it, being especially careful until they are ready for the hypo. The average of accidents has perceptibly decreased.

When in the City of Mexico two years ago, I wished to test some plates and went to a local photographer's for that purpose. It did not require much Spanish to explain my wants, for the camera speaks a universal language. He willingly gave me the use of his dark-room, and it *was* dark, so dark that I could not see to find anything, and it was well-nigh impossible to see any image on the plate. This experience has been so often repeated since then that I have come to the conclusion, either the average operator is exceedingly careless, to need so much precaution, or that there is much dense ignorance on the subject of light in the dark-room. The strongest objection to the use of daylight through any screen is its uncertainty, and electric light would, of course, be better; but the majority of us have to be governed by circumstances. When my light is too strong I draw down the ordinary buff window shade.

Amateurs, ordinarily, use the family bath-room when the household authorities permit, and it often cannot be altered to suit their needs. Well for them, then, if they are members of some well-equipped society. In my case, there is a private bath-room which, the uninitiated say, is thoroughly demoralized by my changes. The bath-tub was moved to one side and a special tank was made adjoining the wash-stand, with large waste-pipe and a rose-sprinkler for washing negatives. In the tank, on four feet, rests a wooden washing-tray with ribbed bottom and a slight ridge on all sides which, at one end, is hinged to drop down, allowing the whole to be more carefully kept clean. This arrangement works well with me though upright washing-boxes seem now to be much in favor; but I often had air-bubbles and other difficulties in their use. On a level with the tank is a shelf of the same breadth, that of the wash-stand, and in every available spot are shelves of different sizes, while under the tank and large shelf are closets. Over it are pasted on the wall a number of formulæ. Across the room, just over the bath-tub, is a small folding shelf for my gas-stove, and above this is a shelf for bromide work. The tubing used for the gas-stove can be detached and used on the jet needed for bromide exposures, special connections being made with the ordinary gas-pipe and jet, which latter has a ruby chimney.

After spoiling several carpets and rugs I discharged them from active service and had the floor painted dark-red, which is cleaned every few days. The walls were once a light cream color, but all the art training possible could not tell their present one. One door leads into a dark closet communicating with my dressing-room and another into a dark hall-way. Over the latter door is a ventilator. The dark-room should be supplied with plenty of trays and graduates, with scales, hydrometer, chemical thermometer, and the very useful rubber finger-tips, for plate-makers do not seem to realize that a razor edge is not agreeable to one's fingers. A friend of mine had his finger cut nearly to the bone on the edge of a plate. My hypo tray is large enough to be supported by the bath tub and I make the solution fresh for every day's work. Acid sulphite seems to keep it clear longer and I cannot too strongly second Dr. Backelandt's remarks on double fixing. An amateur friend once told me that I could not convince him a plate was not fixed when the creamy color had once left it. I often use sulphuric acid in the alum bath, but the Lanier formula for acid sulphite calls for muriatic. A light table on castors is very useful in the dark-room, and a glass rod, but experience is, after all, the best guide to what one needs. Keep everything clean and in order, keep one formula as your firm reliance, keep your hands steady and your head clear, but, especially, in all the manifold exigencies constantly arising, keep your patience. So will difficulties vanish from before you and success crown your painstaking efforts, while it rarely blesses those spasmodic workers who try every formula given them, never long enough to find out the actual worth of any one, and using it rigidly on plates with widely-differing exposures, charging their inevitable failures to anything and everything save their own want of concentrated purpose and conscientious labor. I have only touched on the question of development, but it cannot be entirely ignored in speaking of the dark-room. Like Charles the First in Mr. Dick's Memorial, it constantly demands notice. Let me say, however, that it is a privilege, not to be lightly delegated to others, to see the image grow under one's eyes into a negative and be able, at a glance, to detect its defects or its merits. Strong indeed, would be the reasons that would lead me to allow other hands to bring such work to completion, leaving me only the unsatisfactory part of exposure, in which my individual judgment would be of little value. Carry the work through from beginning to end and in the finished print reap the reward of faithful labor.

Catherine Weed Barnes.

S. W. BURNHAM.

The portrait of Sherbourne Wesley Burnham, the distinguished astronomer, is peculiarly appropriate in the pages of The American Annual of Photography, for he is, beside being an eminent astronomer and scientist, an amateur photographer of the very first rank.

As an astronomer, Mr. Burnham has given, perhaps, most attention to the application of the camera to the telescope. He is at present Chief Assistant of Professor Holden at the Mount Hamilton Observatory of the Lick University of California, and in that position has accomplished more in astronomical photography than perhaps any other living astronomer. But it is as the discoverer of double stars that Mr. Burnham is most widely known. He discovered three hundred double stars and brought them to the notice of astronomical authorities, in less than two years; and all of them by means of a six-inch telescope in an improvised observatory in the back yard of his Chicago home. At this time he was stenographer and shorthand reporter to the Circuit Court in Chicago, and while recognized in St. Petersburgh, London, Berlin, and Rome, as the greatest living discoverer of double stars, Mr. Burnham was known in his own city only as the court stenographer and typewriter which he professed to be.

Since announcing these first discoveries, and properly measuring and cataloguing them, Mr. Burnham has discovered over a thousand double stars, and is, as M. Flammarion of Paris wrote, when sending proof of his catalogue of double stars for revision, "at the head of this department of siderial astronomy."

Professor John Fraser, in the account of his friend, published in the *Century* magazine of June, 1889, says that the five great names in this department of astronomy are the two Herschels, Sir William and Sir John, (father and son); the two Struves, William and Otto, (father and son again), and S. W. Burnham. And Mr. Burnham has discovered many more than either of the Herschels or the Struves; nearly, if not quite, as many as the sum of all the others' discoveries.

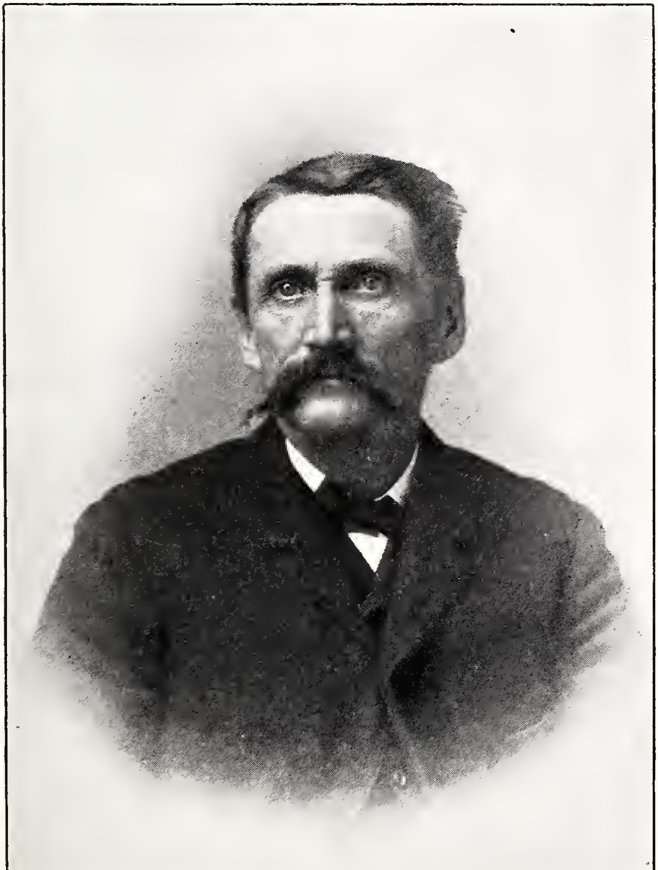
S. W. Burnham, though a Westerner by residence, is a genuine Yankee by birth. He was born in the pretty village of Thetford, Vermont, in the year 1840, and obtained his early education at the excellent Thetford Academy. He did not seem especially inclined toward scientific pursuits in his youth, and, indeed, it was not until he had grown up and adopted

stenography as a profession that Mr. Burnham had his attention directed to astronomy. Professor Fraser, his biographer, speaks of the curious manner in which this was accomplished.

Mr. Burnham was at the time stationed with the army in New Orleans as short-hand reporter at headquarters, and while strolling along the street one afternoon, when off duty, was attracted by the notice of a book auction. He entered the shop as the auctioneer was crying "Burritt's Geography of the Heavens." "The subject," says Professor Fraser, "was one in which Mr. Burnham had at that time no special interest, but he bid for the book, which was knocked down to him." Attracted by the charts of the siderial heavens in this book, he soon became interested in the subject, and on the first clear night commenced his study of the heavens for himself by tracing out the various constellations and principal stars described on Mr. Burritt's charts. Further study of the work only deepened his interest, and he soon bought a small, cheap telescope. This he shortly exchanged for a better instrument, which he took to Chicago on his return to that city about 1866. He now commenced to read the standard books on astronomy and to study diligently the subject, all the time keeping on with his short-hand work.

When the Messrs. Alvin Clark & Sons, the famous opticians, went to Chicago to set up the great telescope in the Dearborn Observatory, Mr. Burnham sought and made their acquaintance, and shortly after purchased a six inch object glass from them for eight hundred dollars. With this fine lens he went to work with increased enthusiasm, constructing an observatory, for the most part with his own hands, in the back yard of his residence on Vincennes Avenue; and in this rude observatory, laughingly termed the "cheese-box" by his friends, the modest short-hand reporter made those first important discoveries which a few years later "attracted the attention and commanded the admiration of the leading scientific men in Europe." He would work during the usual business hours of the day, as Professor Fraser tells us, and in the evenings would retire to his "cheese-box," and there study the heavens until day-light drove him to his bed. "No wonder," writes his biographer, "that when a visitor, perhaps from Europe, went in search of this sleepless, sharp-sighted astronomer, to pay his respects and visit his observatory, he was told by the street children that Mr. Burnham was a 'queer' man, who lived nights in that 'cheese-box.'"

Mr. Burnham was elected a fellow of the Royal Astronomi-



Negative by Hill & Watkins, San Jose, Cal.

Bartholomew & Peckham, Eng., N. Y City.

S. W. BURNHAM.

cal Society, in 1874, and early in 1873 sent his first catalogue of eighty-one new double stars discovered by himself and subsequently measured by Baron Dembowski, the Italian astronomer and "then the most distinguished star measurer living." Mr. Burnham's discoveries attracted the more attention abroad because the double stars which he discovered were the closest and most difficult known to astronomers. When scarcely known in this country as an astronomer, he was in correspondence with most of the leading astronomers of Europe, and recognized by them as easily their master in this field of astronomical research.

In 1876 he was appointed Acting Director of the Dearborn Observatory of the University of Chicago, which honorary position he held for some time.

. In 1879, when the trustees of the Lick Observatory selected Mount Hamilton as the site for their observatory, Mr. Burnham was appointed to make a series of observations for the purpose of testing the conditions of the location for an observatory. In 1881, with Professor Holden, he went out to Mount Hamilton again, by request of the trustees, to observe the transit of Mercury, and on both of these occasions, discovered a great many new double stars. The success with which he fulfilled the commission of the University to witness the recent eclipse on the eastern coast of Guiana is well known by all. The illustration accompanying the brief article by him in this issue of the AMERICAN ANNUAL OF PHOTOGRAPHY will be of especial interest to our readers at this time. The reproduction, though the best that could be made, of course does not do justice to the original negative. Mr. Burnham made a great many interesting photographs while in the south, a group of which has been published in *The Photographic Times.*

He has a large collection of photographs of the very highest order, both as to pictorial qualities and excellence of execution. As an instantaneous photographer he has few equals. Prof. Fraser tells how, in a spirit of fun, he sent some photographs to England in competition for *The Amateur Photographer's* prize, and received the highest award. Such work, of course, with him is recreative photography. His serious photographic work is in connection with astronomy, and in this department he is progressing with his characteristic energy and success.

Perhaps we cannot do better in concluding than to quote the remarks concerning Mr. Burnham's interesting personality,

which Prof. Fraser made in his biographical article several times referred to in this sketch.

"Few love better the social intercourse of their friends, or are more sportive and entertaining in their conversation. Few play so many games, or play them so rapidly and so well as he. He carries with him no indications of a recluse or a martyr. Why should he? for his scientific pursuits come within the scope of his amusements. With strangers he has but little conversation, and rather avoids making new acquaintances. He never speaks of astronomy except the subject be introduced by others, and he never poses as a scientific man. Hence persons who have known him intimately for years have never suspected that he was anything more than a bright, agreeable companion, and a good short-hand reporter. He loves nature; and nothing delights him more than to tramp and camp for weeks in the woods of Michigan, around Lake Superior, or among the Rocky Mountains, with a few genial friends, his trusty rifle—for he is a noted rifle shot—and his photographic outfit." *W. I. Lincoln Adams.*

THE SCREEN IN ORTHOCHROMO-PHOTOGRAPHY.

The use of screens to reproduce colors in photography with their relative luminous value was imagined by Ch. Cros, if memory is not at fault; and as far back as 1870, at the suggestion of Dr. von Monckhoven, who communicated to me his researches in that direction, I experimented with thin glass plates stained slightly blue with cobalt, green with copper oxide and yellow with silver sulphide, but the exposure had to be exceedingly lengthened. Now that one has at his disposal photo-films of great rapidity the objection partly disappears, although the exposure is still very long, and in proportion as the dominant color is less actinic; but the results are far from being as good as those produced by the orthochromatic process. However, if screens alone are insufficient to obtain perfect photographs of colored objects, they cannot be discarded with films dyed by no matter what compound, because the reductive action of the white light is of course the most active and should be subdued by the screen. In this the writer regrets not agreeing with as high authority as the the inventor of the orthochromatic process, who states that plates prepared with silver eosinate can be exposed without the interposition of the yellow screen in photographing landscapes; for, contrary to

this statement of Dr. H. W. Vogel, in all the comparative experiments made this season, it was found that, no matter what the quality of the light, a screen, sometimes very slightly tinted, it is true, was a *sine qua non* to obtain perfect foliage, which, without it, had that exaggerated snowy appearance seen in pictures taken in the old manner, that is, on plain, undyed films.

As to the exposure, one should bear in mind that orthochromatic films do not admit of being under-exposed; else the benefit of the dye is not obtained. It must be said, however, that without a screen the silver eosinate film exposed by the drop shutter—using as large a diaphragm as possible—yields better photographs than the ordinary film, but, like the great majority of pictures so exposed, they show a deficiency of details in the shadows, and even in the lights, owing to the necessity of pushing the development to obtain what can be brought out in the shadows.

In conclusion we advise the use of screens in all circumstances and full exposures in order to reproduce the especial color for which the film is dyed. *P. C. Duchochois.*

MOUNTING PRINTS.

When I first commenced making photographs I had trouble in mounting the prints, especially if they were dry. I would think they were rubbed down smooth and good, but, on drying, the edges and corners would curl and leave the mount. Now, I think I have a better way. I paste the back of the print and lay it in position on the mount, and instead of rubbing it down smooth, I put it in a book, laying a clean paper over the face of the print, put the book in a copying press, screw it down hard, and the deed is done.

The print must be removed at once, so that the covering paper may not be cemented on by paste which may be forced from under the edges of the print.

This is especially good for bromides on heavy paper, as they must be mounted dry. In this way, you can hardly help doing a good job. The print cannot escape being pressed into perfect contact with the mount. *It has to come.* This may not be new to many of you, but I have never seen it in print, and finding it so handy and perfect in its work, I offer it for your consideration.

F. E. Fairbanks.

ENLARGEMENTS BY TRANSPARENCIES.

The process of enlarging by means of a transparency plate while involving considerable care and some trouble is capable of producing excellent results.

Where the original negative is obtainable no other method should be thought of.

To make the transparency, place the negative and transparency plate in a printing frame. The ordinary dry plate does exceedingly well for this work. Expose to a gas jet or lighted match, holding the negative about three feet from the flame. Twelve seconds is an average exposure. Develop with hydrochinon, oxalate or eikonogen.

Carry the development far enough to give a bold brilliant image, but not so far as to make the shadows dense.

After washing, the plate must be carefully wiped with a piece of soft cotton rinsed with *clean* water, and racked away where it can dry *free from dust*. When thoroughly dry fasten it with strips of gum paper to a paste-board mask, the opening of which is only large enough to admit light through that portion of the image you wish to show in the enlargement.

If a vignetted bust allow working space for the printer.

This mask is to be fitted to the rabbet at the back end of a small camera, where the "cutouts" are placed, or it can be tacked to any suitable "cutout." If clear sky on a level with the instrument is obtainable, place the box as near as possible to the side light or any convenient window. Close the ground glass to exclude direct rays from surrounding objects. Remove the lens and head block and bring up the camera which is to receive the plate for the enlargement—but first a word as to the lens. While rectilinear lenses are undoubtedly best, any lens will answer that will "cover" as large a plate as the transparency from which the copy is to be made.

On no account must a lens of smaller field be used. Push the lens through the opening made by the removal of the head block from the smaller box. A dark cloth thrown over the juncture will effectually shut off any light that might enter here. It need not be absolutely light-tight. By means of the two sliding bellows the image can be quickly brought to any desired size. Be very careful to have the transparency evenly illuminated. It is best to make a trial exposure on a small plate, as it is quite necessary that the timing be exact.

Bear in mind that the shortest exposure that will produce a fully developed negative is best. Over-exposure, no

matter how carefully restrained, will produce more or less graininess in the shadows. If the transparency be well defined and full of half tones a moderately strong developer is best, as it will give clearer shadows, a point to be desired in all copy work. If suitable outside illumination can not be had, direct the outfit at a white screen under the skylight, pitched at whatever angle will reflect the most light. The transparency should be rather thin for this method.

A negative made in this manner will need little or no retouching, as the enlargment of the texture is scarcely discernible.

Geo. Sperry.

CERTAINTY AND UNIFORMITY.

The busiest professional and the most intermittent of amateur workers agree in one thing—the desire for such a mode of working as shall give the best possible negative from any given exposure, with the least trouble and with a constantly satisfactory color, no matter what brand of plates is used. Of course, some who are experimentalists rather than photographers try every new thing, having their reward in the experiments themselves. Those who seek their reward in good pictures will, if wise, adopt some good developer and stick to it. They may rest quite content that their developer, even if not the newest advertised novelty, *with* the knowledge they have gained of its working will in their hands produce better results than would the new thing *without* familiarity in its use. Still there are differences in the effect produced in the long run by different chemicals and it is worth while when we are choosing to select such formulæ as have stood the test of large experience and offer the greatest combination of advantages. Without laying any claim to originality for the following the writer can testify that for varied work from largest to smallest sizes and from studio portraits to landscapes and copying nothing to equal it has been found. It may interest some to know that in England this, or something practically similar has been the stock in trade of one of those enterprising peripatetic gentlemen who call on us with the air of philanthropists, but get dubbed by a thankless generation "process-mongers." As the writer was not a purchaser he is not pledged to secrecy; those who did part with their guineas seem liberal with testimonials, and though it is against the axiom that what costs nothing is not appreciated he endorses the testimonials and recommends the undecided to adopt it.

The pyrogallic solution calls for little remark further than that it may be varied to suit circumstances. Reduce its strength for actinic subjects as, for instance, white dresses in a brilliant light, and increase strength in Winter and for dark subjects. A stock solution is made of 1 ounce to 15 ounces water and a little (say 20 grains) citric acid added. For normal work prepare

A	Pyro stock solution	3 ounces
	Water make up to	20 ounces

Use in equal parts with the following:

B	Washing soda	18 ounces
	Pure sulphite soda	20 ounces
	Water, hot	1 gallon.

It will be noted that the alkali is in rather large proportion and that the sulphite is in excess of the alkali, which has not been the general custom. The quality of the sulphite is important, the commercial salt has been used with the greatest success for months together and then a sudden change is apt to occur with the same bath without any visible reason, no doubt arising from decomposition induced by exposure to the atmosphere. It is therefore safest to use the purified article.

For normal work equal parts of the solutions are used, as for instance studio work where the exposures are pretty well known. Also for instantaneous work, but for all uncertainties as timed landscapes and for copying it's best to begin with very little of the alkaline solution, say one part to two or three of pyro, or if over-exposure is feared, one to five or six, with even a few drops of bromide solution, though this latter is seldom needed.

The next point of fixing dispenses with the customary alum solution for hardening and decolorizing the film, the two operations being combined in the

Compound Fixing Solution.

Hyposulphite soda	4 pounds
Chrome alum	3 pounds
Hot water	1 gallon

It should be left till the sediment has settled, and it is best to fix in the grooved porcelain tanks.

The negatives will be found quite uniform in tint, a neutral grey similar to the color of the retouching pencil, and entirely free from the ever-varying tints of yellow that characterize dry-plate work too often.

Benjamin Wyles.

BORDERS.

WHAT the setting is to the gem, the border is to the print. It has been well said that few pictures are so carefully placed upon the ground-glass that they cannot be improved by a judicious trimming. In the same way there are few prints which cannot be improved by some sort of "dodging."

The improvement of which I wish to speak is that of making a border of some sort around the print.

The most satisfactory border is a narrow white line or margin. This looks well with nearly every kind of negative.

To produce this when the negative is on glass it is only necessary to affix such a mat of opaque paper as will protect the margin of the sensitive paper on which the print is being made. Every printer of any experience will know how to do this and no words of instruction are needed.

A word as to the form of the mat may not be out of place. If the subject on the negative be well placed, the best way is to make the mat so that the border shall be simply a narrow white line, as before stated. When a part of the negative will give a satisfactory picture, mat out all the rest, using any form which may seem most appropriate, whether oval or square. The circle is seldom satisfactory on anything at all, and may therefore well be avoided. When a negative is matted so as to produce the narrow line, it is occasionally desirable to cover the corners with small circular pieces. This will in many cases improve the print. This is especially the case when the lens used fails to cover the extreme corners of the plate.

With any kind of film negative it is easier to print with a border than not. The best way to effect this is to use a printing frame one or two sizes larger than the negative to be printed from. For instance, suppose that we wish to make a number of prints from 4x5 film negatives. Take either a 5x7 or $6\frac{1}{2}$x$8\frac{1}{2}$ printing frame, and of course a piece of clear glass to support the negative. Take also a piece of opaque paper of the same size as the glass, and with a sharp knife cut an opening just enough smaller than the negative to make about $\frac{3}{16}$ of an inch margin. Now gum the two opposite edges of the paper, and lay the paper upon the glass; place the glass in the frame, and put in the back just as if you were ready to print. Set the printing frame aside for a few minutes to dry. This last is important, as the mat will lie more smoothly if it is dried in this way. While waiting for the glue to set several glasses may be fitted up with mats. This will be found convenient,

especially if one wishes to make only a single print from a large number of negatives.

If the gumming and the drying have been carefully done the mat will lie very close to the glass, and the films may now be slipped between the mat and the glass, and will lie as smooth and even as one could desire. There are some negatives which will not be improved by any sort of border, and will look best when mounted upon the card direct. A few will look best with dark borders, and these may be readily obtained by proceeding as those did who used to make the "medallion" portraits which were popular some years ago.

Finally—what is worth doing at all is worth doing well. Let your mat be cut neatly. Have the margin of an even width and neither too wide nor too narrow. Above all let the margin add to the picture and not distract the attention. Otherwise don't use it at all.

L. L. Anderström.

HINTS ON SILVER PRINTING.

To ENSURE good results in the finished print many things must be attended to, and I make it a rule to be very particular in getting up the paper, so it shall be free from tear drops, or other defects.

While floating the paper a gentle movement of the pan keeps the solution in motion and causes an even silvering of the surface. The drawing it over a glass rod ensures quick drying, as well as prevents the soaking of a surplus of silver into the paper.

In warm weather five or eight minutes fuming is quite enough, only remember that the paper after silvering must be dried quickly and perfectly; then immediately fumed and printed.

Long fuming makes dull blue prints. So does long toning. Put a little acetic acid in the water before you work the prints.

The less time that passes by between silvering the paper and putting the prints in the hypo the more brilliant are the prints.

Red spots on the prints appear when water sprinkles on them before or while they are washed after printing, or when they are not carefully immersed in water and shaken to prevent small air bubbles sticking to the prints. Always put every print upside down into the water, toning bath and hypo,

press it down a little and shake it. Never even think of fixing or making the hypo (only that of the stock solution ready dissolved of saturated strength, which should be ready all the time) before all prints are toned and washed and the toning bath put back in its bottle.

The least trace of hypo on your fingers will spoil all prints and the toning bath too.

The silver dish must be washed and well rinsed and drained each time before silvering, no matter how clean it looks.

The silver bath must be filtered each time and filtered back after silvering. The same filter paper answers for a long time.

The gold toning bath needs filtering only after toning, but needs renewing with every batch of prints.

Although all this is old, yet it may be the means of some one doing things in a more systematic way, and herein lies the good of all this repetition. *M. H. Albee.*

MATILDA'S MADNESS—A PLEA FOR SPECIAL PRINTING PROCESSES.

I DO not know how Matilda passed the interregnum, but she tells me she never had so much fun from the day she left off playing dolls till she bought a camera. It is such an old story, the learning how to take pictures, that I pass over all details and focus the interest of this brief sketch on the moment when, having mastered the technicalities of development, she began to look askance at the shoe-polished views the local photographer printed from her judiciously brought up negatives. Like the rest of us, she had passed through her novitiate of climbing dark and dirty stairs to sky-parlor studios, of waiting the leisure and pleasure of a black-fingered silver-stained man who came at length only to tell her that he had found her negatives too dense or too thin, but had done his best (to spoil them!). She had grown callous on the subject of being told her artistic attempts were out of focus and her still-life subjects had moved; she had wearied when asked why she did not take trains in motion and trotting horses; she was used to having her choicest plates yellow with strengthening and peel with gummy varnishing; above all she had endured having two 4x5 views mounted on both sides of a card and crooked besides, yet the worm did not turn. One day, however, when she called after eleven weeks' waiting for a set of seashore pictures, which she had first designed as

Christmas presents and later as Easter offerings, and received a package of uniformly printed gilt-edge card-mounted *things*, every one with a dark pink sky, no detail in foreground, with but an occasional high-light in the face of some unimportant figure, accompanied with the remark—"We were hurried, Miss, and a new boy we have did the printing. We have mislaid the negatives, as we have so many from amateurs but they were rather poor, I believe, and you probably will not care for any more. Here's the bill"—the worm did turn. I think it greatly to Matilda's credit that she paid the bill, and since she was but yet a woman, I do not blame her for giving the photographer a piece of her mind, as she sorted over the package and found several of her own set missing, the deficiency being made up by prints from the large amateurish stock on hand. When she went home and looked individually at the collection, and found over-exposed and under, dense and thin, dead blank skies and pale ones, mountain, sea, river, families and solitary figures, timed portraits and instantaneous shots had all been subject to the same process, she had a moment of great mental illumination, and presently came to a conclusion sure to be reached sooner or later by every intelligent worker.

"I will not only take pictures but make them," she said. "And if it takes more time to print, I will make fewer." Then she went to work and failed ignominiously thirteen times out of twelve. The neighbors who had liked to be taken for nothing by an amateur, and printed for a trifle by a professional sniffed at her home-made albumens, and turning away said: "It's all luck, any way, see how nicely Matilda did at first and now she has lost the trick of it."

Her first departure was on ferro-prussiate paper, but as she was obliged to apologize for each one as "a poor thing, but mine own," these experiments brought no fame. Printing on bromide paper by gaslight, with all its attendant advantages and disadvantages, not to mention stains, transferrotype transparencies, Pizzighelli and ordinary platinotypes came in turn, and after six months, there was absolutely less finished work to show than when the professional had done it all, but, but, but, but Matilda who had struggled *con amore* had learned by failure to measure success. There was indeed mighty little success to measure, yet in the pile of fading albumens, grayish blues, stained bromides and over-printed platinotypes, she had found what one may call an equivalent unit by which to judge which plate would best yield one kind of a print, and which

some other. To speak concretely, she decided that one should develop with the printing process to be chosen always in view, or if the exigencies of over and under-exposure necessitated certain results, paper suitable to the negative's possibilities must be invariably selected. That is to say, if her hard black and white plates gave good platinotypes that was the method to be employed for them, while bromides were found to bring something soft and artistic from the thin views. "Blues" she found needed plucky details, and transparencies an absolutely perfect negative. Since people still speak of Matilda's madness on the vexed question of doing one's own work, and special printing processes for special cases, I have made this plea, not to prove her photographic sanity, but in the hope that some ANNUAL readers, similarly afflicted, may be helped by her methods.

Adelaide Skeel.

REMINISCENT PHOTOGRAPHS.

EVERY amateur knows the embarrassment he suffers through the many requests of friends and chance acquaintances he meets for a picture to remember the day by. On every pic-nic or excursion a score of fair guests are asking for a picture of this, that, or the other. He cannot refuse them all, nor can he give away a half dozen cards to each without making his amusement mere drudgery, nor can he take every whimsical picture without wasting his supply of plates. Neither can he sell his photographs without sacrificing his pride and tone as an amateur. I have hit a plan which solves the problem and is highly satisfactory to my friends, besides necessitating the giving away of but one single card board to each person. I carry in addition to the regular $6\frac{1}{2}$x$8\frac{1}{2}$ camera, a small affair, resembling a tape measure or a blacking box, and called a "vest camera," which takes six diminutive photos on a single plate. With this I take six reminiscent pictures relating to the day or the excursion, in addition to the large photographs. These I insert or "cameo" into the corners or elsewhere in my regular large pictures, and thus a friend gets on one mount both the main subject and several side views or memories. For instance: a piazza view of a group looking outward, and in the corner a small picture of the landscape they were admiring; or a mill door with a fair one looking out and the incoming yacht she was watching; or a yacht speeding by and a view of the cozy lunch table down below; or a picturesque

little country church and the genial face of the parson thereof; or a country mansion with little groups of the grotesque tennis players or the splashing bathers. The subjects will suggest themselves in almost endless variety. The small prints can be inserted in some otherwise rather blank space on the larger one. They should be cut with a sharp knife any shape desired, and the corresponding hole in the body picture should be cut by the same pattern so as to insure a perfect fit when pasted on the mount, and then the burnisher should be used hot so as to close up the joints perfectly. So done it will look as if printed on one paper and the effect is very pleasing to the recipient and very economical to the amateur.

Frederick F. Thompson.

PHOTOGRAPHY IN NATURAL COLORS.

Is PHOTOGRAPHY in natural colors discovered? I claim it is, but the average photographer and the person who knows little or nothing of the technics of photography will not grant its discovery, because the claimant cannot expose a plate under ordinary circumstances, take it in the dark-room to be developed and bring it out into the light, refulgent in all the glory of the spectrum.

For the sake of perspicuity let me lay aside theories like primary color sensations, multiplicity of primary colors, effects on nerve fibrils of the eye, etc., etc., and allow me to adhere to the time-honored theory of the three primary colors of the spectrum. Suppose a photographer were to make an exposure on a sensitive film and subject it, first, to a solution of potassic dichromate and then to a solution of lead acetate. Granted that the conditions were such that both these solutions affected only that portion of the plate which was yellow and green in the original. Assume further that after washing this film were immersed in a solution of, first, potassic dichromate, and secondly, ferric chloride. Granted again that these solutions would only affect the parts of the exposure corresponding to the blue and the green in the original. Assume finally that the film were now immersed in a solution of potassic sulpho-cyanide and then again, in a solution of ferric chloride, and the resulting color would only affect the film corresponding to red and orange in the original. What would be the total result? A picture in natural colors. The lead acetate and the potassic dichromate would pre-

cipitate a yellow color known, commercially, as chrome yellow; the potassic ferrocyanide and the ferric chloride would produce a pure blue, known as Prussian blue, and the potassic sulphocyanide and the ferric salt would produce a red. We have now the three primary pigments in their natural places and the secondary colors formed by combination. What have men done from Ducos du Hauron down to Mr. Bierstadt? They have filtered the colored rays from the plates according to methods already well-known, and have inserted, mechanically, pigments in the result, equivalent to those just mentioned. Chromo-artotypes and photo-mechanical productions of a similar kind, called by any name, are true photographs in natural colors, and those so called authorities who do not grant it, would be the first to acknowledge it of any man, who produced the colors in the crude manner first mentioned, were such a production feasible.

Maximilian Toch.

RETOUCHING FROM THE GLASS SIDE OF THE NEGATIVE.

It is not always convenient to retouch upon the film side of a landscape negative, except to spot out faultly places with carmine, but by properly intensifying weak portions of the plate from the back the artistic effect of the photograph may be very much enhanced.

Prepare for this purpose the following two solutions:

I.—Gelatine	6	grams
Glycerine	2	grams
Water	50	c. c. m.
Alcohol	20	c. c. m.
Aurantia	0 8	grams
II.—Mastic	1.3	grains
Sandarac	6	grains
Ether	60	c. c. m.
Benzole	17	c. c. m.

Coat the glass side of the negative, with solution I, while warm, level the plate well and allow to dry on a place free from dust. When dry and hard scrape with a knife the colored gelatine from the sufficiently dense parts, and let it remain wherever the plate is glass-clear or not sufficiently developed. Then coat with No. II, which produces a surface similar to ground glass. Also from this second coat scrape off the high-

lights, so that all those places wanting in density remain under cover.

Even quite poor negatives have been made to print well with this method.

A. Miethe.

NOTES ON PHOTO-MICROGRAPHY WITH SIMPLE APPARATUS.

In writing the following notes I do not address myself to those who have complicated and expensive apparatus for photo-micrography, but to those, who, having perhaps only a small view camera would fain try their hand at a combination of camera and microscope.

With this end in view I will cursorily relate how I have used one of the simplest and least expensive of pocket cameras for this purpose.

The camera I refer to consists simply of a wooden box $3\frac{3}{4}$x$3\frac{3}{4}$x$3\frac{3}{4}$ inches, without bellows, but with a short tube carrying a single view lens. The plates used are $3\frac{1}{4}$x$2\frac{3}{4}$-inch size.

My method of using it is as follows: The microscope is placed upon a base board about 2 feet 8 inches long by 12 inches wide; one of the feet of the tripod is firmly held by a wooden clamp to insure steadiness of the instrument, which is placed in the horizontal position.

The camera is mounted upon a movable car of the proper height, which runs smoothly in grooves or on rails firmly attached to the base board.

The microscope and camera are now connected by a metallic adapter which slips over the eyepiece cap and accurately fits the tube containing the view lens. The eye lens of the eyepiece and the view lens should nearly come in contact. If the adapter fit the parts accurately, considerable rigidity will be ensured, and I have never been troubled with indistinct negatives due to instability of the apparatus.

It is best to retain the eye-piece in the microscope, as the shortness of the camera is such that without eye-piece only low magnification can be obtained, even with comparatively high powers.

By retaining the view lens, light is lost, it is true, but no correction for actinic focus is necessary; even low-power objectives giving perfectly sharp and distinct negatives.

The microscopic tube and all surfaces likely to give interior reflections, must, as usual, be lined with velvet or dull black paper.

The camera is so light that it can be mounted above the eyepiece, with the microscope vertical, in this way all sorts of objects in liquids can easily be photographed.

I have used objectives ranging from a two-inch to a one-fifth, obtaining good results in all cases.

The time of exposure varying from two to twenty minutes with artificial light—rapid and instantaneous plates being used. Below are given a few examples taken from my notebook.

Object.	Objective.	Eye-piece	Illumination.	Plate.	Exposure.
Gizzard of Cricket.	$\frac{8}{10}$	B	Lamp and bull's-eye	Rapid.........	10 min.
Arachnoidiscus Ehrenbergii	$\frac{4}{10}$	B	Lamp, bull's-eye and substage condenser	Instantaneous.	10 min.
Spirillum undula..	$\frac{1}{5}$	B	do.	do.	18 min.
Bugula plumosa...	$\frac{8}{10}$	A	Carbutt's Multum in Parvo Lantern, with condensing apparatus	do.	$3\frac{1}{2}$ min.
Umbilical Cord, stained with carmine	$\frac{8}{10}$	A	do.	do.	7 min.

As a source of light I have found a kerosene lamp with one-inch wick very satisfactory. This may be combined with the bull's-eye for low magnifications, or with bull's-eye and substage condenser for higher powers.

I have found no advantage in the duplex burner as a source of light. Some of my best results have been obtained with a Carbutt Multum in Parvo Lantern, as sold, with condensing attachment for photo-micrography.

The methods of development that I have used with most success are the ferrous oxalate developer and hydrochinon, Carbutt's formula.

Photo-micrographs taken by lamplight do not develop as readily as those taken by sunlight—the image shows up more slowly. By the addition of a few drops of hypo solution to the ferrous oxalate solution the image is brought out more rapidly and gains somewhat in density.

I have used the hydrochinon developer lately with considerable satisfaction; it is cleanly, does not stain, and produces a negative of good density. *A. B. Aubert.*

EXPOSURE.

There has probably been no subject so much discussed and yet so little understood as the old one of exposure. Had our forefathers in the first stages of photography been burdened with the thousand and one hints and advices on that subject, that the poor amateur of to-day is, he would no doubt have thrown down the gauntlet in disgust and hied himself to pastures new and photography would not be in the advanced state it is in the present age.

While it is true that wondrous strides have been made in the past decade—strides that to-day cause photography to be classed in the first ranks of the arts and sciences, at the same time the difficulties have been proportionately increased, so that the amateur is laboring at the present moment under as great difficulties as the old timer in the good old wet plate days.

A minute's over or under-exposure then would have less perceptible effect than a second's now with the modern rapid dry plates.

While artists discourage the stopping down of a lens on the plea that the perspective is lost, causing both the foreground and distance to be equally sharp, thereby losing the artistic effects, atmospheric impressions, etc., it has been my experience that ninety out of one hundred will prefer a picture that is clear and distinct in all its features.

At the same time the amateur has a latitude of exposure that will materially assist him in the development of his negative in producing a good result.

It should always be the aim to give the proper exposure; this, however, is not always obtainable. Hence to be on the safe side, what would be considered a full exposure should be made, and with a small stop this is more readily timed than with a larger opening. Then when you develop you are morally certain that there is no under-exposure, and knowing this, your developer being made accordingly the results will generally be satisfactory.

The old ferrous oxalate and iron developer is, to my mind, the best for time exposures. Your development is slow, consequently always under control. It is cleanly in its use and requires but little rocking, and the finished negative has a beautiful, steel gray color, which makes it a quick printer. Of the instantaneous or snap pictures which we hear so much about, the less said of them the better. The results are but

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FRANKLIN HARPER, PHOTO.

F. GUTEKUNST, PRINT.

seldom satisfactory, even under the most favorable conditions. Still, there are times, and often, too, when these are the only ones obtainable; then I recommend the use of the largest stop commensurate with the securing of a reasonably sharp picture throughout. A pyro developer of the normal strength diluted one half will do to start with, adding gradually from time to time in very small quantities during the course of development either pyro or alkali, according to the needs of the negative, the former for density and the latter for detail. The detail should first be obtained and afterward the density.

Of hydrochinon and eikonogen, I have nothing to say. They have their advocates who must speak for themselves. Oxalate and iron, or pyro, are good enough for me, and I am not afraid to put the results in competition with any of the modern, new-fangled developers.

Clarence S. McKune.

ORTHOCHROMATIC PLATES IN LANDSCAPE PHOTOGRAPHY.

But little orthochromatic work is done on the Continent of Europe, and in America very probably not much more. Incidental difficulties occurring with the practice of orthochromatic methods are not as much the cause of that, as the ignorance of the advantages offered by them. It has been asserted for example, that orthochromatic plates are not fit for landscape work, because of their being untruthful, incorrect in perspective and wanting in the general and picturesque harmony more faithfully rendered by ordinary plates. How erroneous these assertions are, will be corroborated by everyone who gives the matter mature consideration.

The air between the lens and the object to be photographed reflects bluish light, and dark objects appear bluer the further they are removed, but it does not necessarily follow that their brightness increases in the same proportion as the intensity of the blue. An ordinary plate invariably reproduces blue light, even when of a darker shade, but it obliterates contrasts; the middle ground and the contours of the far distant horizon are blurred, scarcely distinguishable from the adjacent sky. Such a picture does not represent truthfully the scene, nor the aerial perspective. Very far from it. Distant mountain ranges do not appear as they should; the contours are blunt, and through want of precision, and the loss of form, all plastic

effect is gone. The impression of altitude is destroyed in the gradual ascent of mountains, distant objects appear nearer, and the far off gigantic mountains look like neighboring hills. These evils may be remedied to some extent by short exposures, but it is not only the distance we wish to represent in a photographic landscape—the foreground, very important in most cases, demands also our undivided attention. Green is the predominant color of the foreground in a landscape, but green produces upon the plate the opposite effect to blue, and no matter how bright it may look to the eye, it comes out invariably too dark, because it is under-exposed. Foregrounds demand therefore long, and frequently very long exposures; for the middleground they must be shorter, and for the background when formed of very distant objects and sky, extremely short exposures. But as we can not serve two masters at the same time and with equal satisfaction, matters must be compromised and we expose for the background a little over, and for the foreground a little under. But whether our artistic scruples are appeased by such proceeding is quite another thing. It is true that, in exceptional cases, ordinary plates will give good results. The background is not always formed of distant, blue mountains, and very often there is but little sky in a landscape, neither is the foreground always of the insufferable green color. Foregrounds are frequently sufficiently illuminated, and the sky is covered with masses of dark clouds. But exceptions prove the truth of the rule.

In our dilemma we resort finally to the orthochromatic plate, the above-mentioned objections to it being in all probability not entirely groundless, and we will attempt to show in the following how far these plates are superior to the ordinary kind, and in what respect they can not compete with them. It is quite evident no orthochromatic plate can exist that will reproduce all colors at one time in correct tone value, for even with the application of a yellow ray filter, corresponding with other conditions, approximately correct tone values only will result. Our task is therefore the reproduction of color brightness correct as near as possible, and we do so by selecting plates of appropriate properties, and by the construction of suitable ray-filters. I will not anticipate your views on the selection of plates or color-sensitizers, were it only because I am not acquainted with the commercial orthochromatic plate of America, but if Americans are in that respect not better situated than we are, I can only plead for the use of self-prepared bath plates sensitized with ammonia-erythrosin-silver. The

dye Erythrosin acts as a chemical sensitizer, and at the same time increases the general sensitiveness of the plate. It may be used in concentrated solution, but the emulsion must be absolutely free from alkaline bromides, the presence of which would tend to a decomposition of the dye.

To increase the action of yellow and green, for which rays these plates are highly sensitive (for red they are so but to a limited degree) yellow ray-filters, for the suppression of the forcible action of blue and violet, must be interposed. By these means it is at the will of the operator to reproduce distances with clearness, and distinctly, when the green and brown of the foreground will photograph with detail and of sufficient intensity. But how is it that orthochromatic landscapes, with clear and distinct mountains in the background, do not always represent their character correctly? With them we will soon become conscious of a want of aerial perspective; delicate detail, developed exclusively on ordinary plates, is here entirely left out, distant objects are represented with the same vigor and brilliancy as the foreground, the effect of distance is destroyed, and objects appear to be smaller in proportion. With such landscapes the sky in the negative plate is not intense enough, it is semi-transparent only, and its density is at the utmost not higher than the middle tints, by no means equivalent to the blue of the sky, as impressed upon the eye. The contrast of light clouds upon the blue sky is at least in our zone not sufficiently correct, and can not possibly be so in more southern climes, where the atmosphere is far more transparent than with us, and of a deeper color. Considered from an artistic point of view such pictures are inferior to those made upon an ordinary plate, and from these facts and the results obtained we deduce that the blue rays reflected from the air between apparatus and object should be cut off to but a limited degree, that is, ray-filters of considerably less intensity should be interposed. Their intensity should be just sufficient to cut off the blue of distant mountains. For views with less blue, such filters may also be successfully used, for when the distance of a landscape is more distinct and of less aerial character it is admissable to reproduce it with more vigor and brilliancy. In the selection of ray-filters it should be our aim to take one of lower intensity the lower the sensitiveness of the plate for blue and the higher the sensitiveness for yellow. With landscapes the ray-filter should not be adapted to the subject but to the properties of the plate. To determine those it will become necessary to make a trial exposure with the yellow

screen, but judge of the result not from the tone of the negative but from a proof. If the distant view has still too much of aerial effect the yellow screen will require to be a shade darker. Very dark ray-filters will never find application in landscape photography, unless it is necessary to subdue dark blue or violet to such a degree as to make it print very light.

Ray-filters may be entirely dispensed with for autumnal landscapes, with yellowing foliage, or for twilight views when the whole scene bathed in rosy tint is illuminated by the rays of the setting sun; when the yellow rays reflected from the air assume the function of the yellow screen. Landscape negatives taken late in the afternoon are generally of the highest artistic effect. The illumination is mild, not glaring, the shadows more transparent and not abrupt, the foliage is not composed of small glittering and separate leaves, but forms, as it were, large coherent masses of distinct shape and without dazzling light.

It need hardly be mentioned, that while all ordinary plates requires a much longer exposure towards sunset, for an orthochromatic plate made quite sensitive for yellow rays it remains constant or nearly so.

For the interior of forests, or other quite shaded places, orthochromatic plates with yellow screen require much longer, perhaps three times as much, exposure than an ordinary plate; but in just such cases is the yellow screen of eminent service. With it we soften the strong and stray lights playing between branches and single leaves, producing better half-tones in the masses of foliage. Halation invariably occurring with wooded scenery is almost entirely obliterated by orthochromatic plates and yellow screen, unless the laborious and tedious method of backing up the plate with colored collodion or dark varnish be preferred.

Yellow collodion films have been highly recommended in place of colored glass screens. On account of their extreme thinness they cause no perceptible difference in focus, and as they absorb scarcely any light, the exposure is very considerably shorter than with a glass screen. For long focus objectives and the reproduction of line drawings and other similar originals, and when absolute sharpness is a necessity these filters cannot very profitably be employed; for landscapes however they are of incalculable value.

To prepare these collodion films a scrupulously clean glass plate, previously rubbed with talcum is coated in the usual

manner with a 4 per cent. collodion, colored to suitable intensity with aurantia or dimethyl orange, dried on a warm place, cut near the edges and stripped. The films may be preserved between the leaves of a book and fastened with gum arabic over the aperture of the diaphragm.

Experienced practitioners will probably find nothing new in the foregoing remarks, but there may be valuable hints for some. To recapitulate, the advice given may be expressed in a few words: Do not discard orthochromatic plates and ray-filter for landscape work, and when using them avoid carefully all exaggerated effects. *Charles Scolik.*

ARE SPECIALISTS NEEDED IN PHOTOGRAPHY?

We think they are. A look backwards into the past will certainly convince us, that arts and sciences advance to a certain stage, and then either remain stationary for a longer or shorter time or plunge forwards with remarkable energy. Let us investigate this assertion briefly to prove or disprove its correctness. Architecture is by most critics considered a finished art, and in proof thereof they point to the famous cathedrals of Europe and claim that it can go no further. Chemistry for many long years languished at that point where many a brilliant mind was fruitlessly searching for that marvelous but ever eluding stone, and all, meanwhile, were letting slip through their fingers facts daily occurring, that possibly would have revolutionized the world. To medicine many of the satires of LeSage in his *Gil Blas* could have been applied even as late as the beginning of this century. In optics we have the authority of Camille Flammarion, probably the greatest living astronomer, in saying that after remaining stationary during more than half a century, the science and art of optics is at present making great and majestic strides forward. Other arts and sciences could be mentioned, but space will not allow it. To what then shall be ascribed this stage of inertia, or of even merely holding its own? We think that it may, both in the arts and sciences, be mostly ascribed to the following. There is a common saying that such a one, "is a good all around man;" meaning that he can put his hand to any branch of his trade or occupation and perform his work satisfactorily to his superiors; but does that all around man make any improvements in his work, or any startling additions or inovations on existing methods, so as to increase the amount done or facilitate the

manner of doing it? No, as a rule he is content with what he does. Do we not rather look to the one who applies himself to one particular branch, and seeing its necessities and possibilities is urged on to improvement, and makes them, or it may be to one, only a looker-on who sees as it were in a flash a better way to do it, and does it. It may be that if James Watts had not been watching the escaping steam from beneath the lid of the tea-kettle, we should still be travelling in the clumsy lumbering coach of his day, or sailing in those ungainly ships, that sometimes sailed as fast astern as forwards. We all know about the discovery of the telescope, but how was it before it was much more than a toy? Galileo's first telescope magnified three times. The principle of the stereoscope was known to Euclid 300 B. C. Four hundred and seventy-five years afterwards it was described by Galen, and sixteen hundred and seventy-seven years after that, the first instrument was manufactured by Duboscq in Paris. If then there has been found in almost, if not all the arts and sciences an inertitude; there can also be found, with almost the same certainty a reawakening sooner or later, which with its new energy and directness carries everything before it, and advances it in a way beyond that, which the human mind deemed almost impossible. But it requires boldness in order to succeed, and an ability to throw off the shackles of the contentment of a good all around man, seizing that branch most agreeable and devoting most if not all one's time and energy in endeavoring to obtain all its possibilities, and advance it to the topmost notch of the position which of right belongs to it. In order to do this we see the necessity of men and bands of men working on specific branches for the benefit of the whole.

This century has been wondrously prolific in this great reawakening and advancement in all the arts and sciences—and the inventions and discoveries made, all tending to the lessening of labor and amelioration of mankind, have been enormous, and not confined to skilled workmen of mature age alone. It is stated that the youngest inventor recorded at Washington is a boy aged 15 years—inventor of important rolling-mill machinery. Forty years ago, perhaps a few years longer, the text books on chemistry devoted but a few pages to what was then almost a *terra incognita*—organic chemistry—now a complete description of the derivatives of the coal-tar group alone would nearly equal at least one-half of the bulk of the text books then in use; and to become thoroughly conversant with all of the organic chemistry of the day would require

more years than is usually allotted to man. The immense strides that the science of medicine, with its collateral branches, has made in the last fifty years, is almost beyond our comprehension. To what, then, shall we look for an explanation of these prodigious changes? Simply to the fact, that as in other arts and sciences of the day, these are worked in a systematic, special way—not upon the whole but in separate and especial branches.

Commercial chemistry has its bands of experts working in various ways and on different substances. Take the production of the exquisite colors derived from the coal-tar group—the subtle perfumes from the same sources and various other resultants, all are from the same wonderful source. The medical chemist is steadily working on such subjects as will best produce results for the benefit of suffering humanity. Then, again, the whole of the human body may be said to be mapped out for the especial study of the organs contained therein by the specialist for that particular space. The time has passed to ask *cui bono?*—the results have long ago answered that question. A little over fifty years ago Daguerre announced his discovery, and published his process, which process has been entirely superseded by others. Fox-Talbot a short time prior produced his paper negative. But what wondrous strides has photography made in that time. And the uses to which science has put photography are very numerous, from the records of the infinitely little, to the infinitely great, from the microscope which deals with the invisible, to the vastness of astronomical wonders. The latest contributions to our knowledge of the sun, moon, and stars, made by photography, strongly contrast with the researches into the invisible world of nature revealed through the microscope.

In connection with the study of spectrum analysis photography has and does play an important part, for it has already recorded lines not visible to the naked eye, lines revealed only by the camera in that part of the spectrum in the violet and lavender regions, and even beyond all dark to us. Instantaneous photography by the magnesium flash has been applied to the study of the structure of the retina of the eye, as it rests in total darkness.

After considering what has been stated, the advances made by photography in the last twelve months, and the urgent calls made upon it by the other branches of science, we can not any longer shut our eyes to the fact that if we wish to keep well abreast with all, the time has fully come for the specialist in its

various sections. The field is already too great for one mind to grasp the whole, and we think that our leading amateurs should now select some special department of photography for exhaustive study for the benefit of the fraternity; certainly more good would be accomplished by this division of labor and concentration of energy than is possible under our present methods. Photographic chemistry is still but little known, and we need many earnest workers in that division alone. Astronomical and microscopic photography claim the full attention of their votaries, and ask for more. Spectrum analysis calls for help. The formation of the latent image is but imperfectly understood, and the theories advanced in explanation are but partially satisfactory. We seem to be on the very verge of successfully photographing in natural colors, but the workers are few. Several fascinating applications of the art remain unexploited simply because no one has thought or cared to investigate. It is true that some of the societies have entered on this line, but unfortunately it has been in most cases in a rather spasmodic and unsystematic way. We know not yet the possibilities of photography, but even of what we think we do know, there is yet very much left to be investigated that will amply repay the painstaking investigator, and be of intrinsic value to us all. And now permit me to give a word of advice and comfort to him who may think that he has not the time or ability to become a specialist. Do not drop out of the ranks, but stick to that particular branch in which you make your best work, and strive with all your best energies to outstrip all in *that*. If you succeed you will have become a specialist.

John H. Janeway, M.D., U.S.A.

ON MOUNTING STEREOGRAPHS.

EVERY now and then we see articles in the photographic journals lamenting the decline of the stereoscopic view, and making eloquent appeals for its renaissance. Yet, somehow or other, the stereoscopic picture does not seem to be popular. What is the reason? In the opinion of the present writer,—who, by the way, is in thorough sympathy with every advocate of the stereoscope, and prefers binocular views to all others as souvenirs of summer outings,—the cause of the widespread indifference to this most charming form of photograph, is the care and trouble involved in properly *mounting* the two parts in such a way as to give a true stereoscopic relief to the

finished picture. So it has occurred to him that a few words on the subject of mounting stereographs might prove a useful contribution to the pages of the "American Annual."

The writer's system of mounting is extremely simple,—requiring only two cuts of the knife or trimmer more than an ordinary "carte" or "cabinet" requires,—and the views are sure to register correctly, and to give true natural perspective when looked at through the stereoscope. Two glass forms are necessary,—one for trimming the tops and bottoms of the pictures, and the other for trimming the sides.

We will suppose that the prints have been made from double negatives on 5x8 plates. Before beginning the trimming process, place all the prints in a pile before you, face up. Taking hold of the right-hand edge of the pile, turn it over, from right to left, so that the backs of the prints will be uppermost, and what was

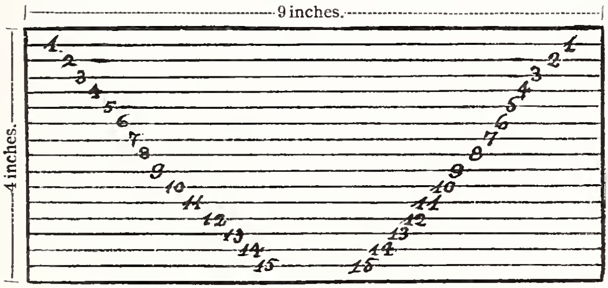


Fig. 1.

the *right*-hand view will now be the *left*-hand. With a soft pencil mark a letter L, or a cross, or some similar mark, on this left-hand view as it now lies before you. (It is really the *right*-hand when the print is held naturally, face up, but, as is well known, "rights and lefts" must exchange places on the mount.) This mark is to distinguish the left-hand half of the picture, which must always be affixed to the corresponding half of the mount; and by labelling the prints once for all in this manner, all uncertainty in subsequent working is avoided. The prints are now ready for the first trimming, with form No. 1. This, as shown in Fig. 1, consists of a strip of ground glass 4x9 inches, with a series of fifteen parallel lines drawn upon its ground face, a quarter of an inch apart. Of course plain glass will do perfectly well for both forms, if you happen to possess a ruling diamond for making

the lines, but ground glass will be found preferable for two reasons: the lines can be drawn with a lead pencil, and the rough surface takes a better hold on the print, and thus prevents slipping. Both forms can be cut from an 8x10 focusing screen, and the edges smoothed on a grindstone. The use of the parallel lines will presently appear. Lay the prints, marked on the under side as aforesaid, on a sheet of glass or zinc, as usual, and place the form on the print. Move the form about until the *same object* in both halves of the pic-

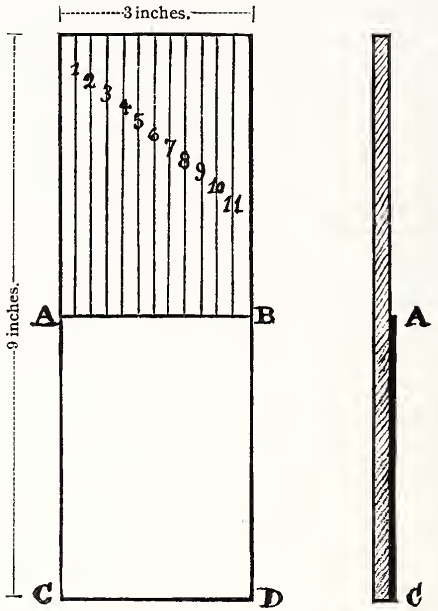


Fig. 2.

tures,—such as a pebble in a roadway, a branch of a tree, an eye, hand, nose of some figure in a group,—is in contact with one of these lines. As there are fifteen of these placed so near together, some one of them will be sure to serve the purpose. Now the two parts of the picture are in perfect alignment, and the trimmer is passed along the top and bottom, finishing matters as far as those edges are concerned. Lay this print aside, and trim in like manner the tops and bottoms of all the prints you have in hand. They are now ready for form No. 2. This is also made of ground glass, 9 inches long by 3 inches wide. It is shown in plan and in section by Fig. 2.

A piece of paper, A B C D, about the thickness of ordinary albumen paper, is pasted over one-half of the form, and the top edge, A B, is cut and trued to an accurate right angle with the sides of the form by means of a try-square. (In Fig. 2 this paper is represented by the blank space in the plan, and the thick line in the section.) From the edge, A B, vertical parallel lines are drawn, a quarter of an inch apart, as in Form No 1, and numbered from left to right from 1 to 11. (It is hardly necessary to say that the figures must be drawn wrong side around, or "looking-glass fashion," to read right on the smooth side of the form, which is always kept uppermost when in use.) Taking the prints once more in hand, Form No. 2 is applied to the *left-hand* picture crosswise; *i. e.* at right angles with the position of Form No. 1. The edge of the paper guide, pasted on the lower half of the form, is now pushed up even with the lower edge of the picture, and serves as a T square to make the sides truly upright, and the final result a perfect rectangle. Note some object on which one of the lines falls, and the number of the line—(say No. 5.) Run the trimmer along both sides, and one half of your stereograph is complete. Now place the form on the *right-hand* picture, square it as before by means of the edge of the paper guide, and adjust it so that the object on which line No. 5 fell in the other half is now under line No. 6. Or, in general, let the line bisecting a given object be *one number higher* in the right-hand picture than in the left. The reason of this is to show a little more of the left in the left-hand half of the picture, and of the right in the right-hand half, when they are at last *in situ* on the mount. (Remember always that the "rights and lefts" change places in mounting; and our pencil-mark made in the first place will ensure this.) Trim the sides of this left-hand half, as before, and place the two parts aside together, backs uppermost and pencilled half on top. Proceed in the same manner with all the prints, until all are ready for mounting.

On your mounts ($4\frac{1}{4}$x7) draw a vertical line across the middle, as a guide for properly placing the pictures. This can be done while the prints are having their preliminary soaking. Drain them as usual, lay them on the mounting-table in a symmetrical pile, the marked half of each uppermost. Remembering that this pencilled half always goes on the *left-hand* side of the mount, proceed to paste and smooth down in any approved fashion. The middle line on the mount will ensure the accurate position of each of the two parts, and the result will be a picture fulfilling every condition of stereoscopic vision.

While this method has taken some words to describe, it is really very simple and expeditious, and as such is cordially recommended to the great army of Amateur Photographers.

Clarence E. Woodman, Ph. D.

A STANDARD METHOD OF DEVELOPMENT.

In ordinary photographic work the mode of development must be adapted to the nature of the subject and the character of the result which it is desired to produce. Uniformity is not possible. For scientific work, such as stellar photography, for testing plates, and for certain other experimental purposes a standard method of development is desirable, and I have made a number of experiments with a view to determine the most suitable formula for such a developer. Any standard, to be really useful, must meet with general acceptance, and it seemed to me at the outset, that any proposed standard developer must satisfy certain conditions. It must in the first place be capable of developing the maximum amount of detail with a minimum exposure, without at the same time affecting the parts not exposed to light, *i. e.*, without producing chemical fog. It must also (1) be simple in execution ; (2) resemble as closely as possible the methods used in ordinary practice; (3) involve the use of only such chemicals as can be purchased in a state of purity and are not hygroscopic, or liable to undergo other alteration, when stored with ordinary care, and, (4) the solutions must be easily prepared and not liable to alteration.

The substances which most nearly satisfy these conditions are pyrogallol, ammonia, sodium carbonate, and the alkaline bromides. Of the latter ammonium bromide is most easily obtained in a state of purity, but the use of potassium bromide is imperative when sodium carbonate is the alkali employed. The use of sulphites is not admissable because they are difficult to obtain in a perfectly pure condition, are very liable to alteration, and their exact influence in the developer is not known. Consideration of the various points involved led me to conclude that a standard developer should contain.

A Pyrogallol, ammonia, and ammonium bromide ; or
B Pyrogallol, sodium carbonate, and potassium bromide.

Many experiments were made with a view to ascertain the influence of the concentration of the developer, the relative proportions of its constituents, the influence of exclusion or non-exclusion of air, the influence of continuous or occasional

rocking and the like. Duplicate experiments were made with several different kinds of plates and the details of the experiments will be found in the *Journal of the Photographic Society of Great Britain*, vol. 14, pp. 134–142.

It was found that if the sensitiveness of plates is measured by the maximum amount of detail (*e.g.* the sensitometer number) developable after a given exposure, the result is independent of variations in the composition of the developer within somewhat wide limits, provided that it is allowed to act for a length of time sufficient to produce its maximum effect. The same result had previously been obtained by Mr. Lyonel Clark in his experiments with developers of various kinds.

The time required and the gradations of the resulting image vary, however, with the variations in the composition of the developer. Continual rocking during development give somewhat higher general density than occasional rocking but the gradations were slightly better under the latter conditions. When the time of development does not exceed ten minutes exclusion of air is not necessary, but with longer periods the action of the air is distinctly injurious. Development with exclusion of air is easily effected in a dipping bath of the old pattern which is filled to the top with the developing solution, and is closed with a flat piece of thick india rubber kept in position by an india rubber band. The relative quantities of pyro and alkali in the developer do in a marked manner affect the tendency to produce chemical fog, and the results of my experiments lead me to recommend the following standard methods of development:

STANDARD PYRO-AMMONIA.

Pyrogallol.. 5 parts
Ammonium bromide.................................. 5 parts
25 parts of real ammonia (NH_3) in 1000 parts by measure of the solution.

Develop for 10 minutes in an open dish or closed vessel, with occasional rocking, at a temperature of 15 deg. C. (60 deg. F.)

The developer is made up in two solutions which are mixed immediately before use. The pyro solution should be made with distilled water just before it is wanted; the ammonia and bromide solution will remain unaltered for a very long time if kept in well-stoppered bottles in a fairly cool place. The solutions are as follows:

a.	Ammonia (NH_3)	5 parts
	Ammonium bromide	10 parts
	Water *up to*	1000 parts
b.	Pyrogallol	10 parts
	Water *up to*	1000 parts

Mix in equal volumes immediately before use.

Ammonia solution of the required strength is prepared in large quantities at a time, by diluting strong ammonia solution with 15 volumes of water and titrating the liquid with a solution of 37.06 grams of pure crystallized oxalic acid in 1000 c.c.m. of water, using as an indicator a solution of 1 part of ammonia in 500 parts of dilute alcohol. Each cubic centimetre of the oxalic acid solution is equivalent to 0.01 gram of ammonia, NH_3. The strength of the ammonia solution being thus determined, a volume of it which contains 5 grams of real ammonia is taken, 10 grams of ammonium bromide is dissolved in it, and it is then diluted to 1000 c.c.m.

STANDARD PYRO-SODA.

Pyrogallol	5 parts
Anhydrous sodium carbonate (Na_2CO_3)	10 parts

And 2.5 parts of potassium bromide in 1000 parts by measure of the solution.

Develop for half an hour in a closed vessel at a temperature of 15 deg. C. (60 F.)

This developer is also made up in two parts; the pyro must be dissolved in distilled water, but the alkali and bromide solution will keep unchanged.

a.	Anhydrous sodium carbonate	20 parts
	Potassium bromide	5 parts
	Water *up to*	1000 parts
b.	Pyrogallol	10 parts
	Water *up to*	1000 parts

Mix in equal volumes immediately before use.

Pure sodium carbonate is best made by heating the pure bicarbonate at 150 deg. C. until it ceases to lose weight. It must be kept in a well-closed bottle.

Some brands of plates will give chemical fog with the quantities of alkali recommended in either case, but it may be concluded that the quality of such plates is not of the highest desirable standard. All the English plates of best repute are not fogged by the proposed standard developers.

The proposed standards agree very closely in composition with the developers used in ordinary practice; they do not

produce chemical fog on plates of good quality when allowed to act for a time sufficient to develop the maximum amount of detail which they will show with a given exposure; the proportions of the constituents are simple, the materials are easily obtained in a state of purity, and the solutions are readily prepared. It seems therefore reasonable to hope that they will be generally adopted by photographers whose work requires the use of a standard developer of general applicability.

C. H. Bothamley, F.I.S., F.C.S.

ORDER AND CLEANLINESS IN ALL THINGS.

Justus Liebig, the great German savant, said at one time: "The amount of soap consumed by a people is proportionate to its state of culture." Apply the sense of these words to Photography, one might say order and cleanliness in the atelier and laboratory is commensurate with the proprietor's conscientiousness and intelligence, which secure to him the respect of his patrons, and will guard him against financial losses. Cleanliness and accuracy should reign supreme in all parts of a photographic establishment; not only are visitors impressed favorably with the nicety of a well arranged reception room, with bright and well-dusted picture frames or artistically placed furniture and hangings, but they contribute to their comfort, and facilitate greatly the work of the operator. The same, but to a still greater extent, applies to the laboratory. There every jar and bottle should be labelled plainly and distinctly and every tray be cleaned, put in a handy place and well secured against dust and other contamination.

It cannot be denied that the public is more favorably impressed with the productions of an atelier, where accuracy and cleanliness is perceptible everywhere, than if it were otherwise. I am very far from advocating excessive luxury displayed in the reception room, and am rather inclined to think rooms of that description are adverse to the comfort of visitors. But a *salon* fitted up with solid and stylish furniture not only testifies to the proprietor's taste, but creates most favorable impressions upon the patron and assists to put him into that pleasant state of mind, so desirable for the making of satisfactory portraits. It is exactly the same in the operating room. When everything is there in faultless order, the visitor will be impressed with confidence, and justly presume that the accuracy and diligent

attention displayed in all his surroundings will be equally applied in the making of his picture, and he will place himself in the operator's hands with confidence and without hesitation.

The unnecessary, noisy moving of furniture, camera stands and backgrounds, in the patrons presence, is highly objectionable. A principal who allows his assistant to do that, or does it himself forfeits the esteem of the patron, makes him nervous and distracts much from that confidence, so necessary to the maintenance of authority in the operating room.

If we enter the laboratory, how often do we find a frightful disregard of order and cleanliness.

There, quite near to the washing trough, stands an open plate-holder. When washing a plate just taken from the fixing bath, drops of hypo splash into the holder, and a plate inserted will necessarily come in contact with the fixing agent. And when developer is applied to such a plate, the tiny drops of hypo solution will be found to spread all over the plate, spoiling it totally and compelling a repetition of posing and exposing. The ultimatum of the careless operator is invariably to find fault with the manufacturer of the plate. Or a friend has recommended to the principal, development with pyrogallol, instead of the previously used ferrous oxalate. After compounding carefully the requisite solutions a plate is exposed and ready for development, but as there is no new tray on hand, or none that has been carefully cleaned, the operator rinses superficially one in which plates had been developed with oxalate. But behold—with the first application of the pyro solution it turns black as ink immediately, the plate develops but feebly and a thick fog prevails all over it. It is natural that under such circumstances a verdict against the use of pyro is then pronounced. But how many experiments have resulted in total failures, just on account of carelessness, and how many plates have been ruined by similar barbarous treatment?

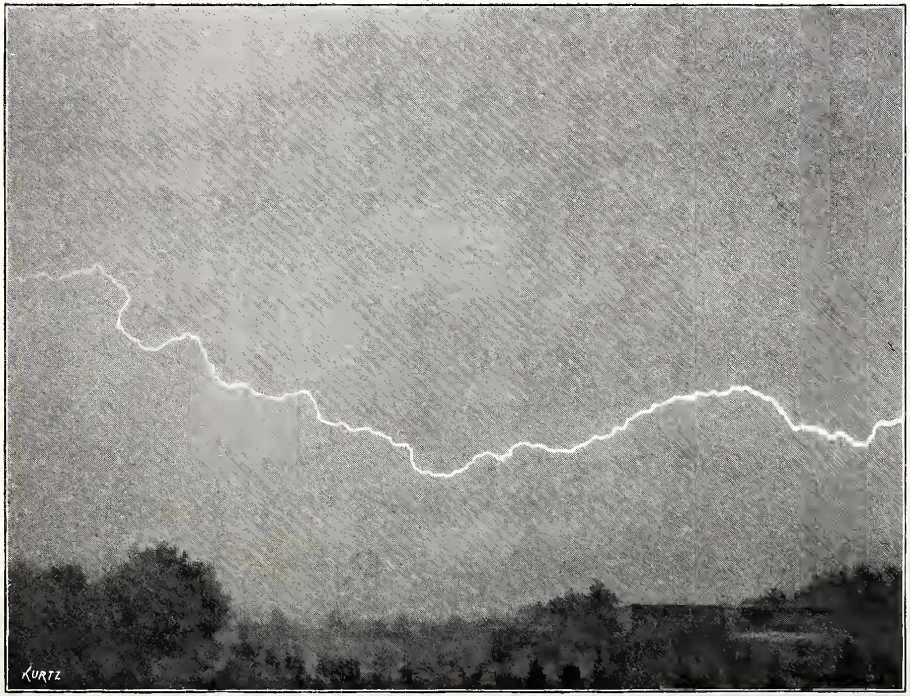
With disgust and with despair the manufacturer of plates stands before such inexplicable riddles, when he is conscious of having furnished the best and most faultless wares.

With order and cleanliness in the laboratory such failures can never occur.

Let us finally glance at a disorderly printing room. Printing frames covered with dirt and dust will be found, and prints full of dirt spots are of daily occurrence. "What is the use of keeping retouchers?" asks the printer in extenuation of his own negligence. Gold solution and the fixing bath are likely to be found in close and dangerous proximity to each other. Prints

Negative by W. N. Jennings, Philadelphia. Kurtz Process.

"DARK" LIGHTNING.



Negative by W. N. Jennings, Philadelphia. Kurtz Process.

HORIZONTAL LIGHTNING.

are carried from the gold to the fixing bath so carelessly that hypo may easily be splashed into the gold. A few drops of hypo only, one may say, but certainly enough to interrupt the action of the gold bath or stop it entirely, but no one becomes aware that the carelessness of the printer is the source of all this trouble and vexation. With the gold solution and fixing bath kept a reasonable distance from each other, and with accurate and careful manipulation neither vexation nor financial loss would have occurred.

Let us respect and honor the photographer who conducts his work conscientiously, and whose first business principles are accuracy, order and cleanliness.

Fritz Müller.

PHOTOGRAPHS OF LIGHTNING.

The photographic study of lightning is a very interesting one, and the results obtained fully balance the outlay of labor and patience expended in the attempt to capture the evanescent image.

After many years experience in this branch of photography, the most satisfactory results have been obtained by the use of a little ten dollar camera with its Waterbury single lens.

The moon furnishes a good lightning focusing point, which is marked upon the camera bed.

"Ivory," celluloid, or paper films, backed with black unglazed paper or cardboard, are more likely to give a true representation of the electric discharge, glass being apt to produce a double or halated image.

Of course, the absence of contrast between lightning and daylight, and the impracticability of using an instantaneous shutter renders the production of a photograph of lightning during day time out of the question.

An open window with a clear view of the horizon is desirable, otherwise it is well to have in mind several points from which clear views may be had looking north, south, east or west.

Upon the approach of a thunderstorm the camera, properly focused, is wrapped in a rubber cloth, and the operator is protected from the elements in a similar manner. When the storm has reached its climax, the electric fire appearing to blaze up immediately in front of the camera, the lens is uncapped, and recapped immediately after a discharge of lightning.

The writer has often noted the fact that as soon as an electric pathway is opened up in space there immediately follows a succession of discharges along the same line, and the movement of the camera during a multiple discharge of this kind has given rise to the impression that lightning is not so quick in its action as is generally supposed.

The method of development arrived at after numerous experiments is to immerse the exposed plate or film in a weak soda solution for about five minutes, rocking the tray constantly; followed by a dose of pyro developer containing about five drops of 10 per cent. bromide solution. By this means more detail can be obtained than by the ordinary method of development.

The two photographs which illustrate this article were taken at midnight on June 11, 1890. There was a ten minutes interval between the two discharges. One occurred in a horizontal, the other in a vertical direction in the same portion of the sky. The length of these sparks has been estimated to be in the neighborhood of five miles.

The writer has been hoping to obtain good stereoscopic lightning photographs which will help to designate the distance at which the discharges take place from the camera.

W. N. Jennings.

PURIFYING THE PRINTING BATH.

The printing bath by continued use becomes saturated with albumen. The prints from such a bath refuse to tone satisfactorily, and when toned turn red in the fixing bath and remain so. No amount of sunning will remove the albumen. Nothing but the most heroic treatment will answer the purpose. The bath must be fused.

This is done by placing it in a porcelain-lined kettle and boiling it down dry, and continuing the heat till all bubbling and foaming cease, and the pure liquid becomes quiet in the bottom of the kettle. The albumen is now entirely burnt out. After cooling, the silver may be redissolved in rain or ice water—enough to make the required amount—silver added to make the usual strength, sunned till clear, filtered, and it will work as well as or better than a new bath.

Some carbonate of soda should occasionally be added to the bath, enough to keep it neutral. It should also be kept in the sun as much as possible. A porcelain-lined kettle is better than a regular evaporating dish on account of the less liability of its breaking while in use.

I always add enough nitric acid to the bath to turn blue litmus paper slightly red before fusing. Any one who thinks that the albumen can be removed by sunning, can be thoroughly convinced of the error by taking a bath known to be saturated with albumen. Sun it a week, or until it is as clear as crystal, then fuse it, and smell the smoke as it bubbles and foams when nearly dry. It is simply the albumen burning out.

Two hundred whole sheets will saturate a half-gallon bath.

J. R. Swain.

LANTERN SLIDES.

The extraordinary popularity of the magic lantern, and the desire of every possessor of a photographic camera to make slides, and to exhibit them eventually publicly, or within the circle of his family, is sufficient to constitute lantern-slide making a very important branch of photography. It is not a very difficult operation to make a diapositive with all the desired qualities, perfect opacity in some portions absolute transparency in others, and to combine with the two extremes, artistically, well-developed half-tones and middle-tones, corresponding to those of the original negative plate. There is hardly necessity to write much about it, or to attempt to give advice how to operate in that direction, for any intelligent operator of average ability can not fail to produce fine results with all the commodities at hand, that is, good and appropriately prepared gelatine emulsion plates, a well-compounded developer, and negatives of one's own make.

If we omit contact printing, an operation by which, candidly speaking, I have never obtained as fine results as those made in the camera, our negatives of 5x7, 5x8, or larger sizes, must of course be reduced to the dimensions of $3\frac{1}{4}$x$4\frac{1}{4}$, generally adopted as the lantern size by all English-speaking nations at least. To procure a camera with long draw, and otherwise constructed for this particular kind of work involves of course some expense, and it has been asked quite often for that reason, why an instrument could not be improvised in substitution for the popular and convenient Scovill enlarging and reducing camera. We have made slides on collodion and albumen plates long before we were surrounded with the facilities of modern times, and notwithstanding the crude and primitive apparatus, the work was good, and the apparatus may prove to be useful to any one making a slide but occasionally. On a window with northerly exposure a ground glass is

fastened, and while the rest of it is completely blocked up with opaque and dark paper, or textile fabric, the negative to be copied is inserted in an open printing frame, or similar contrivance, and placed in rectangular position and parallel with the ground glass, distant from it about two or three inches. The camera—the ordinary one with which our negative has been taken, a Favorite or Waterbury will do as well as the more costly kind—is then placed upon a table, and centered accurately with the negative. By moving the camera backwards and forwards the size of plate is arranged upon the ground glass, sharp focus taken and diaphragm inserted. Before exposing the plate, however, we must cut off all extraneous light between camera and negative by placing a hood of blackened pasteboard, or a tunnel, over the whole apparatus, so that only the light passing through the negatives can become active. The time of exposure depends very much upon color and density of the negative, sensitiveness of plate and activity of the developer. Were we to make for example a lantern slide upon a Carbutt gelatino-albumen plate, the negative being one of average good quality, with a Waterbury B lens stop $\frac{f}{35}$, an exposure of from 20 to 40 seconds would be sufficient, provided developing is done skillfully. To develop Carbutt's lantern plates well an eikonogen solution compounded after my own formula has given fine results unequalled by any other yet tried.

Dissolve by heat $1\frac{1}{2}$ ounces of crystallized sulphite of sodium and 120 grains of eikonogen in 8 ounces of warm water, and add 120 grains of carbonate of potash. The solution acts with enormous energy, and produces diapositives of a beautiful neutral tone. On account of its great energy, the solution should be properly diluted. To commence with take half an ounce, mix with $1\frac{1}{2}$ ounces of water, and add 2 drops of a 10 per cent solution of bromide of potassium. Develop all the details well, and if everything is thoroughly brought out pour the fresh solution off, wash the plate and give it tone and intensity with developer used previously. The results are invariably good, provided proper time of exposure has been given.

Lantern-slides upon gelatine plates should be protected from the influence of moisture. Unvarnished positives, owing to the hygroscopic gelatine, attract moisture, the gelatine begins to swell, attracts dust, and the clearest plate will become dull within a short time. Varnishing with the usual alcoholic solution of shellac has been adopted by many, still a 5 per

cent collodion offers ample protection, and the transparency remains perfectly intact, much more so than with shellac or similar varnish.

It is almost incomprehensible why many lantern slide makers, and especially so professionals, still adhere to the wet collodion or collodion emulsion. With the very excellent gelatine plates now manufactured by several firms, there is indeed no necessity to return to that tedious, and perhaps in many instances uncertain method. I have had opportunity of late to compare a very large number of lantern slides made by a variety of methods, and I must confess those made on gelatine were the best in a large majority of cases, with the exception of those made on albumen films, which to the present day have not yet been excelled in precision and sharpness.

Much has been said and written on the coloring of lantern slides. The many attempts to make a projected picture look equal to nature, by daubing the slide with more or less transparent color, prove abortive in more than one instance. A monochrome slide, if otherwise good, is without doubt the most attractive. *Chas. Ehrmann.*

THE PROPER TIME OF EXPOSURE.

The most discouraging difficulty that the amateur in photography meets with, is over-exposure, and as a rule he is unable to understand why it should be so, the principal trouble being the desire to make sure that the view is thoroughly grasped by the plate, and the failure to realize the rapidity of the process, and that too, by amateurs who claim to be "way up."

The feeling that seems to possess one is, "just a second longer, and then I am sure to get the details in the deep shadows," but that second, though the smallest atom of time, is just where we all make the same error, no matter where we may be. We are inclined to over, rather than, undertime our exposure, having in mind the one idea—to make sure of it.

The old rule of—"Take care of the shadows, and the lights will take care of themselves," is a good one, and holds in most cases, but there is such a thing as being too careful, to the detriment of the negative, and nothing but practice can teach the proper exposure, or true meaning of the above adage.

There has recently been published in "The Processes of Pure Photography," Prof. Burton's Table of Exposure, which will be found of great value to the amateur, in his labors to

secure the proper exposure, though as previously stated, nothing but practice will secure success.

Again most amateurs are more or less desirous of trying portraiture, and have the impression that the nearer they get to an object, if close to a window, the less time it requires, and *vice-versa*, but it is just the opposite. For an instantaneous exposure, we must allow space between the subject and the lens, to permit the light rays to enter the tube directly.

But to come back to our subject. There is another contingency that must always be considered, the time of day and year. It is acknowledged by all, that between the hours of ten and three is the best or proper time for out-door photography, but there are cases where the amateur cannot arrange to get out at that time, and must content himself with what daylight he happens to have, when he falls into the error of thinking, "I will give it a little more time," which, in nine cases out of ten, brings the result of over-exposure.

Then again, the condition of the sky must be taken into consideration, therefore we must bear in mind, when the sky is overcast, and the light fairly hurts the eye, and is well diffused, we must not give the same exposure as on a bright sunny day.

The lens is another vital point in exposure, and it usually takes a body some time to become thoroughly acquainted with this important "bit of glass," to know just how quick it is, and I am confident that there is more over-exposure due to this one fact, than to any other, therefore I should advise all when trying a new lens, to expose, say, three plates, all on one subject, but of different time and then develop; of course, this is unnecessary for an old hand. Again, the failure to comprehend the meaning of the sensitometer mark of the plates, believing that a shorter exposure on a quick plate will make it come out correct, and ignoring the importance of a smaller stop, are a few more of the necessary points to have before us.

On the correct use of stops, one could write almost till doomsday, and still not make it clear and comprehensible, as they must be entirely governed by circumstances and the discretion of the operator.

There have been, I believe, several tables or rules, to guide the inexperienced ones as to the proper exposures, but no matter how well they may be figured out or written, we would still find an occasion when there would be no rule to guide us, for as all know, we very rarely find the same conditions of the light for photography to agree a second time.

Geo. E. Merry.

ARTIFICIAL LIGHT FOR ENLARGEMENTS.

The employment of artificial light for direct enlargements upon developable paper as well as upon gelatine emulsion plates has been recently brought forward again, and justly so. The great sensitiveness of commercial developable paper permits of the use of all the different, even the least effective light sources, down to the simple petroleum light, or an ordinary candle, but by working accurately it will be found that the tone of the positive picture depends very much upon the efficacy of the light source.

Let us observe for this reason first, which of all the light sources at our command are the most suitable for practical work, and promise uniformly good results, and draw within the circle of consideration,—

1. The electric light.
2. The hydro-oxygen gas light.
3. The Zircon light.
4. The recently so successfully employed magnesium flash-light.
5. The petroleum light.

Of these the simplest and most easily obtained is the petroleum light; this, however, requires a long exposure, and is too weak in actinic force to give, especially as regards tone, satisfactory results. Electric light, certainly very well adapted for the purpose, can but rarely be drawn into photographers' service, on account of the costliness of installation and maintenance, excepting perhaps when the requisite connection can be made with electric works in large cities.

Turning to the hydro-oxygen gas light, we recognize its extraordinary efficacy, luminous power, rapidity of exposure, and the decidedly fine tone resulting from its use. This light is procured by mixing currents of hydrogen and oxygen in peculiarly constructed burners, igniting the gas mixture and throwing the flame upon a lime cylinder. By the extraordinarily intense heat the lime becomes incandescent, with a quiet light of dazzling brightness. Were not the preparation of this gas a somewhat difficult operation, not entirely free from danger, this method of lighting would be perhaps the most suitable, aside from the electric light. Our ordinary illuminating gas, carbureted hydrogen, has been substituted for hydrogen, simplifying very considerably the making of lime-light, but with its luminous power and actinic action very much diminished, a fact to be considered. Nevertheless by

this substitution a light of sufficient force to serve for photographic purposes is obtained.

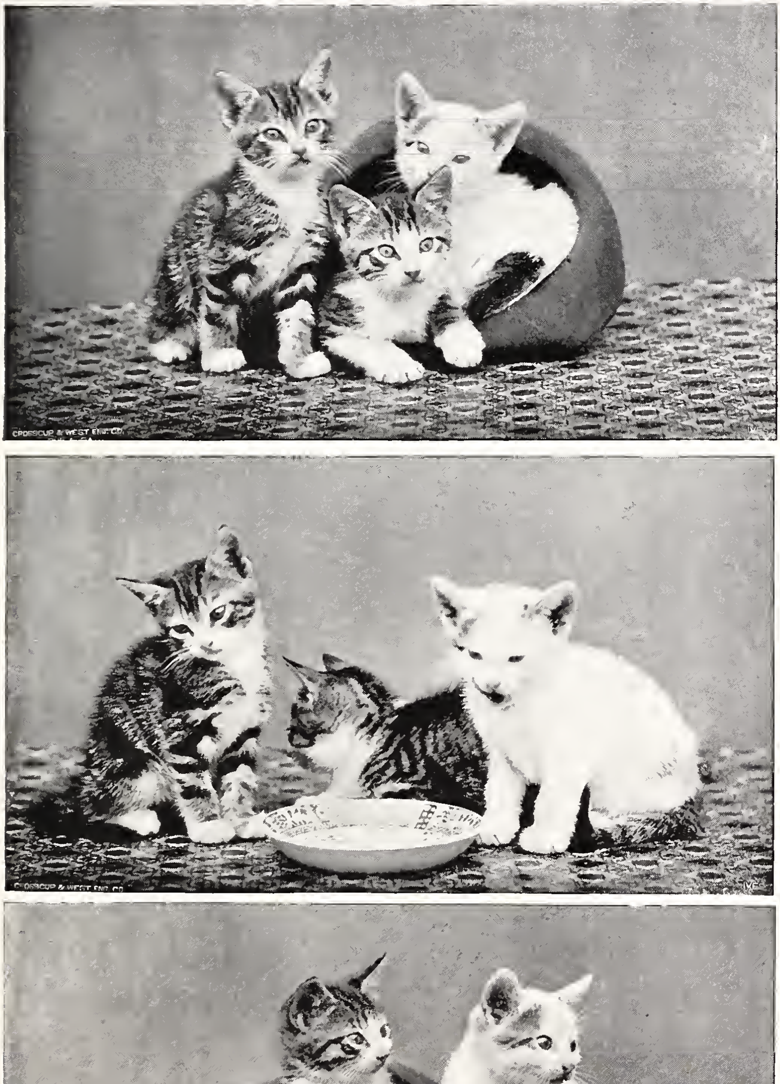
Similar to carbonic acid gas, oxygen is sold ready prepared and compressed into retorts, very convenient for the operator; but being constantly near a retort filled with compressed gas is not very agreeable, and although there is comparatively but little danger of explosion, many prefer to make the gas in their own laboratories.

A modification of the hydro-oxygen gas light is the Zircon light in which a small Zircon plate, enclosed in a platinum cell is substituted for the lime cylinder. The mineral Zircon is prepared and made solid for this purpose by continuous hammering, so that it will not break even when exposed to the most intense heat; this is of great importance when we consider the frequent crumbling of the lime in hydro-oxygen gas. Zircon light has, however, not quite the luminous power of hydro-oxygen gas light. The managing of either of these lights requires a divided attention between tending to the necessary retorts, hydraulic pressure, tubes, faucets, regulating of the flame and the making of the photographic picture.

With electric and magnesium flash-light this is dispensed with. Were it possible to connect any photographic laboratory with electrical works or a dynamo machine, the electric light would doubtlessly prove to be the most convenient. There is no time to be devoted to apparatus, the turn of a crank produces the light at any time. But as these conveniences are not always at hand, and the installation of electric light is very expensive, we will omit its consideration. For these reasons we prefer the magnesium flash-light, and especially so that of C. C. Schirm of Berlin.

Magnesium flash-light is generated by blowing very small particles of pure magnesium powder through an intensely hot alcohol or gas flame. For the making of enlargements, our greatest attention must be given to it on account of its extreme actinic force, the very short exposure required, and the agreeable tone it produces on positive pictures. Furthermore should be considered the total absence of any danger, the possibility of generating light at any time after the lamp has been lighted, and the easy transportability of the apparatus.

Through the extremely low cost of one, a hundred, even thousands of successively produced light flashes, it compares advantageously with electric light, and surpasses it in its photographic application. With magnesium flash-light photographic pictures have been, and are constantly made by instantaneous exposure; with electric light that has not yet been accomplished as far as we know.



Wm. M. Browne, Photo.

THREE KITTIES.

Crosscup & West, Engravers, Phila.

A magnesium lamp constructed for enlarging purposes is illustrated by the following cut:

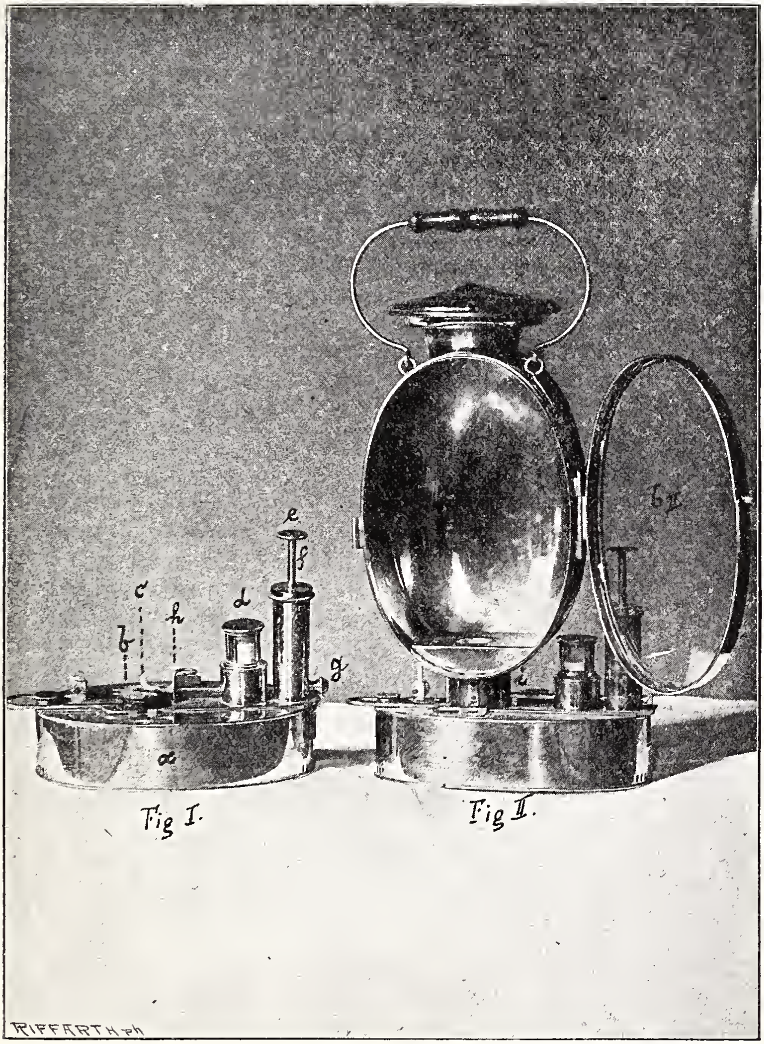


Fig. 1. *a*, spirit lamp; *b*, wick; *c*, tube through which the magnesium powder is blown into the flame.

The magnesium powder is held in the receptacle *d*, and is forced through the flame by means of the air-pump *e* by pressing upon the rod *f* till the whole apparatus is forwarded upon the carrier *g*, towards the wick, so that the tube *c* reaches the centre of the wick *b*. With the stopper *h* the wick is closed.

Fig. 2. *a*2 is an oval attachment to be fastened to *i*, and if necessary closed with the glass door *b*2 against smoke.

The magnesium flash-light has in the short time of its use acquired many advocates on both sides of the Atlantic, and it has been often shown what it is able to accomplish. It has been our purpose to show its utility in the field of enlarging, when it will doubtlessly maintain a steady position.

E. Kiewning

PHOTOGRAPHIC FALSE DOCTRINES.

I AM not speaking in a satirical sense when I say that all photographers who have any self-respect or pride in their calling, do not wish purposely to introduce defects into their pictures. And yet if we follow the dictates of the so-called "naturalistic school" in photography, we must focus "naturalistically." According to the disciples of this "school" the defects of human vision must be taken into account and similar defects reproduced in the photograph!! Of the various defects in our eyesight, these gentlemen content themselves with selecting four to be reproduced in photography—namely, dispersion, spherical aberration, astigmatism, and turbidity.

It absolutely passes belief that such doctrines as this can be gravely read at meetings of societies and published in the photographic press. Without spending an undue amount of space on the matter, let me say that if spherical aberration and astigmatism (or astigmation—photographically they are the same) be desired in a photograph, the operator need only get a cheap bad lens and work it with a very large opening. He will then obtain the defects named in abundance, and will see that the more free his work is kept from them, the better for everyone concerned.

Another doctrine advanced by the "naturalistic" gentlemen is the obsolete fallacy that if the lens be stopped down enough to give everything in sharp focus, "tone and atmosphere" will be wanting. So they will be indeed, if the point of view be improperly chosen and the manipulations badly carried out.

But it is one of the great advantages of modern plates and films, that the lens may be stopped down to almost any degree. "Tone and atmosphere" are improved—not injured, by having every part of the image crisp and well defined. Lenses vary in their power of giving this good quality with comparatively large stops. In my own practice, I choose always rather small stops. *Ellerslie Wallace.*

PRACTICAL SILVER PRINTING.

So much has been written and so many formulas published that it might seem useless to offer anything further on the above subject, but on invitation to contribute something for The Photo Times Annual for 1890, I venture to give my method of preparing albumen paper for the printing frame, trusting it may benefit some of the humble workers who have to do every part of the work themselves. Possibly in this way may I repay in some slight degree the many useful hints I have found in previous volumes of the Annual.

When one has to do every part of the work himself, the more perfect system he employs in all the manipulations the better.

I use a glass bottom tray of my own make of suitable size for a whole sheet. The sides of the tray are walnut, the bottom edge rabbeted for the glass, which is tacked in and puttied with putty, in which is worked some white lead, very much as window glass is set. Fill the grain of the wood with shellac varnish.

The putty dries hard and there is no danger of leaking. Besides my own work, the tray cost $1.50, including glass rod over which to draw the paper. It has been in use four years, and is still as good as need be.

To begin with, I have a silver bath containing 80 oz. of solution, 40 grs. to oz. Mark the bottle at top of the solution. Put in this bath six drops of a 10 per cent. solution of carbonate soda. Shake up and set in the light, where it must be kept all the time when not in use.

With every half ream of albumen paper (use the very best you can get) I purchase 1 lb. silver. This silver dissolve in pure water sufficient to make 48 oz. when dissolved, every 4 oz. of this solution contains a little over $1\frac{1}{4}$ oz. of silver, which add to the bath for every 20 sheets silvered one oz. at a time every 5 sheets. This keeps the bath at uniform strength and allows 29 or 30 grains of silver for each sheet.

Keep the paper flat: for about 24 hours before silvering keep a damp cloth hanging before the shelf upon which the paper is kept. You will then not be bothered with the paper curling up when placed on the solution. I always sensitize paper in the evening, especially in winter.

Filter solution into the tray, float paper two minutes, remove, hang up to drain while placing another sheet on solution, then place first sheet between blotters.

Draw paper over glass rod when removing from bath.

I occupy three minutes for every sheet, seeing that the paper is on the solution two minutes, balance of time taken up in handling the paper, thus silvering 20 sheets in one hour, which is the number I generally silver at one time, whether I have much or little to print.

When the 20 sheets are sensitized, remove from blotters, double each sheet loosely, albumen side out, pin each two corners together with clips, hang up and dry, placing an oil stove beneath.

Returning bath to bottle, rinse tray with very little water, which also put in bottle, which if not full up to the 80 ounce mark, make it so by adding pure water, then put in two drops of the carbonate of soda solution, shake up and place in light, and the bath is sure to be in good condition next time. About once a year I boil away the bath and burn out what impurities there may be.

After paper is quite dry, place in fuming box, where it remains until next morning.

I had a tinner make a can or cylinder about two feet long and six and a-half inches across, the cover sliding on tightly. About three inches from the bottom is put a perforated tin, beneath which a can of unslacked lime is kept, which is changed once in about two months.

The paper is taken from the fuming box, rolled up, and placed in this cylinder.

I follow this plan summer or winter, cold or hot, wet or dry, and always have paper ready when wanted. I have kept paper this way more than two months all right. If it should be slighly yellowed, it comes out all right, white and clear, when toned and fixed.

In this way I have no mealy prints, no unsilvered or insufficiently silvered paper, have no serious trouble with blisters, everything goes smoothly, and I believe it just the thing for small galleries.

A. J. Whalen.

REDUCING PRINTS.

OF the several well known methods of reducing over-printed proofs, the use of the cyanide of potassium is probably the oldest and best known. For some prints, such as those developed on bromide paper and plain paper prints on chloride of silver paper, there is perhaps no better process in vogue.

Next to the cyanide, is the ferricyanide and hypo compound, which for albumen prints, has proved more satisfactory in my practice, than the former. But with either method it is hardly safe to say that the best thing to do with too dark a print is not to put it with the waste paper.

There is another method which I will venture to describe, which judging from trials I have made with it, is likely to to supersede, for albumen prints at least, both of the other processes mentioned.

The solution of bromide and sulphate of copper used for intensifying collodion negatives for photo-engraving purposes, is excellent for bleaching untoned silver prints; superior even to the bichloride of mercury.

To make this solution take of a saturated solution of sulphate of copper (commercial blue vitriol is suitable) 16 fluid ounces, and add ½ ounce each of the bromides of ammonium and potassium dissolved in as little water as necessary for their solution. An untoned silver print immersed in this compound will soon disappear. To make certain that it will not reappear on exposure to light, immerse it in the hypo bath, until the bromide of silver formed by the action of the bromide of copper on the print, is dissolved, the hypo in this case fixing *out* the image instead of fixing it *back again*, as it does when bleached with the bichloride of mercury.

With a well toned albumen print the bleaching action of the copper compound is quite slow and it is difficult to bleach out such a print with the solution. By using it considerably diluted, the reduction of the print may be kept under perfect control. When the latter is only a little too dark, take, say, an ounce of the bleaching solution and dilute it with from four to six times as much water; immerse the print in this until a change is perceptible. Then immerse it in the hypo bath, in which, if it is light enough, it should remain a few minutes and afterwards be washed as usual. If it is not as light as desired it may be returned to the bleaching solution, remembering always, as a general rule, that when a print goes from the hypo into the copper, the more hypo goes with it the more it

will be reduced. So if but little more change be required the print should first be rinsed, so that but little hypo will remain in it. If the print is much too dark it may be proceeded with in inverse order, beginning with the hypo bath and ending with it.

Any one who is inclined to give this process a trial has only, after making the bleaching compound, to practice with a few old discarded prints, to learn whether it will suit him to use it for the purpose for which it is here recommended.

W. H. Sherman.

AMMONIA IN ALKALINE DEVELOPMENT.

The following table may be considered as a supplement to the table of "Comparative Value of Alkaline Carbonates," in the tabular portion of the Annual:

Commercial Name.	Symbol.	Ammonia in 100 parts of water.	100 parts of 36 per cent. acetic acid will neutralize:
Water of ammonia, aqua ammoniæ of the U. S. Pharmacopœia or liquor ammoniæ of the British Pharmacopœia; also known as spirits of hartshorn	NH_3 + water.	10 parts.	102 parts.
Stronger water of ammonia, or aqua ammoniæ fortior of the U.S. Pharmacopœia	NH_3 + water.	28 parts.	36.43
Liquor ammoniæ fortior, or stronger solution of ammonia of the British Pharmacopœia	NH_3 + water.	32.5 parts.	31.38

For determining the strength of any sample of ammonia the following described method will give results sufficiently accurate for all ordinary uses:

To one-half ounce of the ammonia to be examined add enough solution of litmus to render it distinctly blue.

In five fluid ounces of water dissolve eighty grains of oxalic acid, slowly add this acidulated water to the half ounce of blued ammonia, which will be changed to an onion red tint, when all is added, if the sample of aqua ammoniæ contained 10 per cent. of ammonia. If the color changes to the onion

red tint before all the oxalic acid water has been added, then for every half ounce of the acid water remaining unused the ammonia is shown to be 1 per cent. weaker.

If the color remains in the blued aqua ammoniæ after all the acid solution has been added, the sample is known to contain *more* than 10 per cent. of ammonia. In this case repeat the experiment, taking half the amount of ammonia, viz., one-fourth ounce, or 120 minims, and add to it oxalic acid solution of the same strength as before. If the whole five ounces of acidulated water is required to discharge the blue color or change it to onion red in the one-fourth ounce of aqua ammoniæ, the sample is shown to contain 20 per cent. of ammonia.

On this basis the intermediate per cent. of ammonia in any sample may be easily calculated.

For those who are accustomed to work with volumetric test solutions, it may be added that eight and five-tenth grams of 10 per cent. ammonia water are exactly neutralized by fifty cubic centimeters of standard solution of oxalic acid (containing sixty-three grams of acid in one liter of water).

Commercial name.	Symbol.	Molecular weight.	The commercial salt contains of the pure salt about	100 parts of 36 per cent. acetic acid neutralize	Solubility in water.
Carbonate of ammonia (transparent lumps not effloresced)......	$(NH_4)_2$ NH_2HCO_3 CO_2.	157	100 per cent.	31.4	1 in 4

The carbonate of ammonia of commerce is a compound of carbonate and carbamate; the formula is not $(NH_4)_2CO_3$, as sometimes stated.

Equal work is done by 102 parts of aqua ammoniæ (10 per cent.) and 31.4 parts of carbonate of ammonia.

These quantities must be increased or diminished to compensate for impurities or variations in the strength of samples used in actual work.

The 36 per cent. acetic acid of this table is that known as the official acid of the United States Pharmacopœia and is easily procurable in the market.

Sixty grains of bicarbonate of potassa will neutralize 100 grains of this acid.

All parts given in this table are by *weight.*

O. G. Mason.

THE SOLAR CORONA DEC. 22, 1889.

THE accompanying picture of the corona was made during the total eclipse of December 22, 1889, at Cayenne, French Guiana, with the 6-inch Clark equatorial telescope belonging to the Lick Observatory. This instrument is not a photographic telescope, but for any purpose of this kind it appears to give as good a result as would be obtained with an object glass of the same focus, figured specially for photographic work. Of course in the latter case a less time would give the same photographic effect. In eclipse photography this is of little importance, because with the sensitive plates used, the times of exposure must be very short to get any details in the brighter portions of the corona. The aperture of the telescope was cut down to three inches, and exposures made from two to fifteen seconds. Some of these times were about right for the fainter extensions of the corona, but were all too long to get the best detail near the sun.

Two other photographic instruments were used on this occasion, a Dallmeyer six-inch portrait lens of about 36 inches focus, equatorially mounted, with driving-clock, operated by Prof. J. M. Schaeberle of the Lick Observatory, and an eighteen-inch silvered mirror of eleven feet focus, figured by Prof. Schaeberle at Ann Arbor, and worked during the eclipse by Mr. Charles H. Rockwell of Tarrytown, N. Y. The negatives made with the last named instruments were not so satisfactory, as the equivalent times of exposure were much longer, the full aperture being used in both instances. With the portrait lens, this gives an aperture of $\frac{f}{6}$ as against $\frac{f}{24}$ with the Clark telescope. As the times of exposure with the former instrument were considerably longer, this ratio would be further increased, and it would follow as a matter of course, that one or the other set of plates would be of much less value.

The print reproduced here is from a duplicate of one of the six-inch telescope negatives enlarged about two diameters; and represents the inner and outer corona about as well as could be done on a single plate. There is apparently very little, if any, difference in the general form or extent of the corona between the pictures made on this occasion and those of the eclipse of January 1, 1889, photographed by Barnard, Pickering and others. Indeed, it is not by any means certain that there has been any sensible change in the extent of the corona at any time within the range of photographic evidence, although there is, and would necessarily be, a difference in the negatives,

Negative by S. W. Burnham. Kurtz Process.

SOLAR ECLIPSE OF DEC. 22, 1889

due to the circumstances under which the work was done. No reliance can be placed on naked-eye drawings. This will be at once apparent from an inspection of some of the numerous eclipse reports heretofore published. Sketches made by two persons sitting side by side not only have no resemblance to each others, but are as unlike the corona as it is possible for anything to be, if the photographs made at the same time can be depended upon. It is very doubtful if it will be possible with the present photographic methods, to determine whether or not the extension of the corona has any sensible variation in different total eclipses. When we consider the different atmospheric conditions under which the observations must be made; the plates used at different times; the varied exposures; and the differrent methods of development, it is evident that if the same extent were shown, it would be more the result of accident than anything else.

The plates used on this occasion were Seed 26, and they were developed shortly after the eclipse in the usual way with the pyro and carbonate of soda developer. Great care was taken in this part of the work to get as good a result as possible.

S. W. Burnham.

ALBUMEN PRINTS PRO AND CON.

My suggestion is this, that we fail largely in getting the best value from our negatives. By this I do not refer to those faults in printing and chemical manipulation that are so often seen, but the tendency that is almost universal to adhere to the use of albumen paper through thick and thin, and the heedless and inartistic methods of mounting.

Albumen paper is all very well in its place, but to my mind it should be relegated to small work in portraiture, and used with discrimination in the production of large views or architectural subjects.

To *small* sizes in portraiture because:—1st the microscopic detail it renders is offensive to persons of cultivated tastes in large work; and 2d the stretch of the paper is so great as to cause serious distortion of the face. I found by measurement that the head on an albumen paper print was elongated $\frac{7}{16}$ of an inch in a seven inch head. As the paper has no perceptible stretch except in one direction, of course you can print the other way of the sheet with the same proportionate distortion

in the *width* of the face. But distortion there *must* be when albumen paper is used, and the pictures mounted in the usual way. Also the gloss that this paper carries does not commend the result to artistic taste, in large work ; and if it is burnished the crowning degradation has been achieved. Nothing can have a more vulgar look than a great shining, staring albumen portrait.

Another feature to be deplored is that it curls and warps the mount to such an extent that you feel like keeping it in a basket instead of a folio. Some very select and tasteful photographers have a practice of double mounting; but even then the print often has a look as if it lay uncomfortably, and a tendency is always present to curl a little at the corners or accomplish some kind of a twist if conditions favor.

Nothing contributes more to the satisfying effect of a picture than to have it lay perfectly flat and straight. Then a number can be kept nicely in a folio, and handled with some satisfaction without calling different members of the family to sit upon the corners while the print is being examined. It does not follow that because one has bought a large photograph, whether portrait or not, that he desires to frame it and hang it upon the walls of his dwelling.

In employing a mat surface paper this whole trouble is overcome, a soft and artistic effect is attained, with an absence of this biting sharpness; and as such paper has hardly any stretch, or tendency to curl, prints that are mounted or unmounted will lay perfectly flat and give no perceptible distortion. Drawing paper, either white or with some delicate tint, it seems to me, is a most desirable substitute for albumen paper for *large* work, and often for small. Printing with a mask, and thus securing a margin of any desirable width, leaves the print with all the appearance of an engraving, which may be treated and kept in the same way.

Platinum and bromide paper offer many advantages also for a certain class of negatives, and especially when it is desired to keep prints unmounted. The charming Washington souvenir given away at the late Convention well illustrates the value that bromide paper has for small views, kept simply upon the paper on which they were printed.

It need not be denied that albumen paper possesses a certain advantage for views, large and small, speaking in general terms; but the trouble in keeping them in any satisfactory way, unframed, is great, and the *impossibility* of using them unmounted, makes a substitute that overcomes these disadvan-

tages a desideratum. It is also true that there are many views, especially where there are broad masses of light and shadow, that are better rendered on soft paper.

When it is imperative to use albumen paper, a little trouble (or rather a good deal), will largely overcome the annoyances here alluded to. If a print be put under pressure when mounted, and kept there for a week or so—admitting air occasionally—and then trimmed and double mounted, and kept flat again, by pressure, for a couple of days, it is probable that you have attained as nearly a flat picture as is possible unless you mount on a stretcher. But it is necessary to use quite heavy board, and this imparts a certain clumsiness that does not quite meet the views of fastidious people. And besides, it is a trouble that persons buying photographs would pay for with reluctance. Still it would seem that the only way is to bring our productions up to a plane where we can respect them ourselves and firmly insist that they be fairly paid for. This would help to impress upon the public mind (an idea that they are slow in welcoming), that there may be a difference in photographic pictures as in other commodities.

Gustine L. Hurd.

ON THE PROPER CONSTRUCTION AND USE OF THE SWING-BACK, SWING-FRONT, RISING AND SIDE-SHIFTING-FRONT.

Swing-backs are most generally used as necessary aids in obtaining correct views of architectural subjects; though they are also used in the studio, for portrait work. But for the purpose of this article, their use will be best explained by assuming a practical application. Suppose it is desired to obtain a correct photograph of a house, camera occupying a position in front of house, but somewhat to one side of a point directly opposite middle of front. Suppose camera constructed with double swing-back only.

Operation will be as follows: Camera will first be set up level and firm, it will then be swung on tripod until image of house is centered on ground glass laterally, the horizontal swing will then be used, back of camera turning on a vertical axis until it is parallel to horizontal lines of house front. Now, while maintaining this adjustment, camera will be tilted upward until image of house occupies a central position on ground glass, vertically; the vertical swing will then be used to bring ground glass parallel to vertical lines of house. The

close focusing will then be done, and then the largest stop, which will give satisfactory definition over the whole plate will be inserted. Now, while this method, if correctly practiced, will produce a correct view of house, and one that will be satisfactory to many, still the method is far from being correct, and is of the nature of a make-shift. An examination of a camera in the position just described, will reveal the fact that the four edges or margins of plate are each at a different distance from lens, and no two points of plate are at same distance from lens. As far as definition is concerned, a lens used as above, is used under the most unfavorable conditions, and this can only be compensated for by using a very small stop, which is very often not at all desirable.

The above will be quite evident from the following consideration, viz., if a camera and lens be set up in front of a vertical plane, such as a house side or front, in such manner that the optical axis of lens (*i. e.*, the line through centre of lens tube) is horizontal, and also at right angles, laterally, to vertical plane; and if lens is then focused on a point in vertical plane where axis of lens cuts said plane, and the ground glass of camera is also at right angles to axis of lens; then the definition on the ground glass will be as nearly uniform over its whole surface as is possible with lens used, and its largest stop. Lenses are designed and constructed to accomplish above result; and it is only under above conditions that a lens can be used to the best advantage. Now, referring again to the example of photographing a house, let all the conditions be as there assumed, except that the camera will now be assumed as having a rising-front, side shifting-front and double swing-front, in addition to double swing-back.

The procedure would then be as follows, viz.: camera set level, ground glass vertical and parallel to front of house, without as yet using swing-back; the lens would first be shifted to one side with parallel motion, until house was centered laterally on ground glass, and would then be shifted vertically, until house was centered vertically on ground glass. If, after using to their full extent, the side and vertical shifting devices, the image of house was still not centered on ground glass, then camera would be turned sidewise and tilted upward, until image was satisfactorily rendered on ground glass, and then the ground glass would be brought to a vertical and parallel position by means of swing-backs, as in the first case, but after this was done, the horizontal and vertical swinging devices of lens would be brought into use, to bring optical axis of lens at right angles

to plane of house front and ground glass; of course, under these conditions the lens would be used beyond its regular or rated covering capacity, but every part of ground glass would be in the legitimate plane of the focus of lens, and satisfactory definition would be obtained, using a much larger stop than could be used under the first conditions.

The preceding remarks may be summed up in brief by the following general directions: The optical axis of a lens should be kept in a horizontal position under almost all conditions, and it should also, whenever practicable, be kept at right angles to the principal plane of the view or subject, architectural or otherwise, and the plane of the ground glass should always be kept at right angles to axis of lens, horizontically and vertically. The camera which is so constructed as to permit the above conditions to be perfectly and readily compassed under all circumstances, is the only perfect instrument, and the only one which will continue to give satisfaction, as a knowledge of the requirements of a camera becomes more general.

C. W. Grant.

ENLARGING ON BROMIDE PAPER.

Having advocated the use of Hand Cameras for the last few years and as using them entails the knowledge of how to enlarge, I intend taking that for my subject for this year's Annual.

It must be plain to every one that when using a $\frac{1}{4}$ plate hand camera, the negatives taken with it are just the thing for making lantern slides, but are too small for printing, that is if one goes in for exhibiting; hence they require to be enlarged up to 8x10 or 12x15 to be any way in the running, and I now always show my hand camera work on those sizes, and of course do a great amount of enlarging. Thinking perhaps my experience may be of use to the readers of the Annual, I will explain the way I do it.

I only intend touching on the one branch of enlarging on bromide paper, for I consider that for an amateur who only requires one or two prints from a negative to work by making an enlarged negative is too costly and too much trouble, and really now that we have such perfect bromide paper as there is on the market, by a little practice and knowledge any one can enlarge equal to a print taken by contact.

I intend only to refer to enlarging by daylight, as I seldom

use a lamp—better results are got by the use of daylight than by any artificial light.

There are two ways of enlarging by daylight, one where the image is thrown on a board, in the same way as the picture is thrown on the screen when showing the magic lantern, and which I shall call No. 1, and the other by copying the negative, as for lantern slides, but enlarged instead of reduced, and hence you require a camera the same size as the enlargement you intend to make, so that the latter way, which I call No. 2, will cost more to rig up than No. 1, but then one can use any camera that has a long extension.

Now, to go to work, as per No. 1, you require to work in a dark room, as no daylight must get in, or you will spoil your bromide paper. Therefore you must work in your dark-room, or else work in a room where you can shut the light out in some way, as by having a shutter (with a hole in it for your camera) that covers the window of the room you use and that will exclude all light. On the north side of the room I cut a hole in the wall and in this hole I put a frame for holding

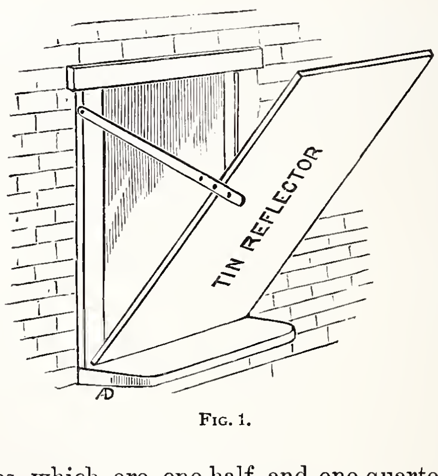


FIG. 1.

my negatives, which are one-half and one-quarter plate sizes. Behind the negative about five or six inches away I place a piece of ground glass to diffuse the light and prevent any reflection of the clouds that may pass over, and on the outside of the wall I place a piece of tin about twenty-four by eighteen inches, painted white to reflect the light from the sky

onto the negative, said tin to be placed at an angle of about 45 deg., as per Fig. 1, which explains itself. Of course, if you can get a clear space so that nothing is in your view from the negative to the sky, then there is no need for a reflector.

Now, inside the dark-room and in front of the hole you have cut for your negatives, you put a camera that slides up and down in grooves; any camera will do, or even a box with a lens in it, as you do not require over ten or twelve inches of a draw-out and seldom that. Then on a table or shelf you

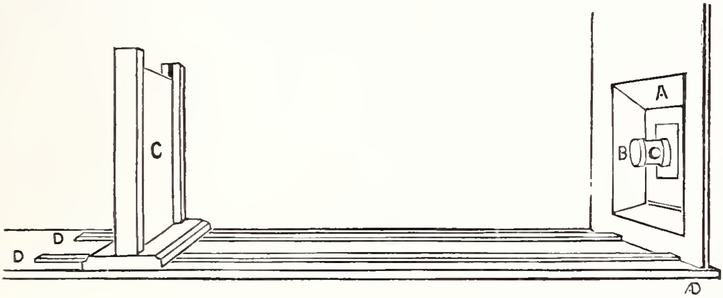


FIG. 2.

nail two grooved pieces of wood and have a drawing board nailed on a stand that will hold the bromide paper; anyone can make it who can use a saw and hammer. The sketch, Fig. 2, will explain what I mean. A, is the camera with lens; C, the drawing-board or stand for receiving the bromide paper; D D, the two grooved pieces of wood that the board, C, goes back and forwards on; B, the lens, almost any lens will do, but do not use a long focus one, or else the board you use for nailing D D on will have to be a very long one. I find a seven and a half inch portrait lens does very well and that is what I use. After focusing your image on the board, C, which should be covered with white paper so that you can see to focus sharp, you require a cap for the lens that has a piece of yellow glass, so that you can see where to pin your paper and not have to work in the dark.

A very good plan if you have a camera large enough (that is to say 10x12) is to cut a hole in the board C, and fit the back or focusing screen of your camera on the back of it so that when you lift your focusing glass your dark slide will fit on all right, and then instead of pinning your bromide paper on a board, you can use your dark slide with a piece of

clean glass in it, on which you put your bromide paper; you can then focus the image on the ground glass and when all is as required you can put in the dark slide, draw the shutter and expose; the great advantage of this is that you are able to print in clouds or do double printing, as you can after the exposure of the first negative shut your slide and then replace your negative with the other without fogging your paper; you are also able to focus sharper. I work with a dark slide up to 8x10 as I have a camera that size, and when enlarging up to 12x15 I then use a board. No. 2 is my favorite way of enlarging as the table which I shall describe has so many uses; it does for enlarging, or reducing (lantern slides) or for copying, and besides it can be used in any room or even out of doors and is always ready for use, in fact it is simply a camera put on a table, which has grooved pieces of wood so that you can draw the camera back or forward and at the other end of the table you have a frame for holding the negatives you wish to

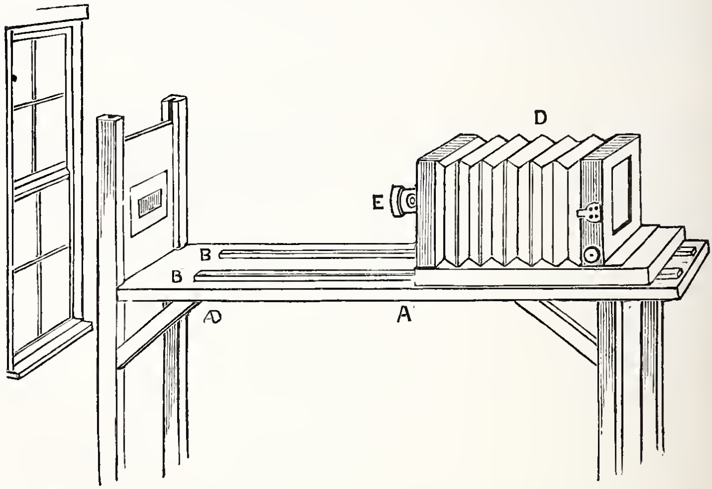


Fig. 3.

enlarge from. The sketch No. 3, will explain what I mean, the only fault is that you require a camera the size you wish to enlarge up with a long extension of focus, but as a rule 8x10 is quite large enough. The sketch quite explains itself,

viz: A, an ordinary deal table. B, the grooves for running the camera back and forward in. C, the carrier for the negative, D, the camera, E, the lens.

You will see by working this way you are able to work in any room or even out of doors; if you work in a room you should put a piece of ground-glass in the window or anywhere *between* the window and the negative, to diffuse the light and prevent any shadows of objects being projected on your negative, and hence on the enlargement. If working out of doors, point the end "C" at the sky and expose as usual. You can also use this for artificial light, but then it takes a long exposure; you can enlarge much quicker by burning a few inches of magnesium ribbon a foot or so away from the negative. When working in a very light room or out of doors you require to place a dark cloth over the space from the lens to the negative, to prevent light coming on the lens.

Now you can take your choice of these two ways of enlarging, bearing in mind that if you work No. 2 way you are able to make slides as well as enlargements, and that is a great advantage.

I am a great advocate of bromide paper, and I do all my printing on that paper both by contact or enlarging, and find I can get results that one cannot tell from platinotype. Bromide has many advantages over other papers, as it is so easy to dodge the printing and to put in clouds, and then you have only the one paper to learn to work, both for your printing and enlarging, and I strongly advise all who do not know how to work it to learn at once and they will never regret it.

I am still of the opinion the best results are gained by using the iron developer. You may now and then get good results with quinone or eikonogen, but for certain results I find iron far the best. When using the iron developer always use the acid clearing bath as advised in the directions before washing, and use plenty of it so as to prevent iron stain, fix well and wash for a long time to gain permanent results.

In conclusion I can only say I hope the two ways of enlarging I have described will be found to be of use to the readers of the Annual, and hope my few remarks may lead some of them to try bromide paper for contact printing as well as enlarging, as it is certainly the paper to use.

A. R. Dresser.

RETROSPECT.

It is looking back over nearly the whole of a long life—something more than half a century—to recall my first acquaintance with photography. It was through one of the daguerreotypes that came over to America. The subject was my brother, who had been on a visit to England, and as the thing was all the rage at the time, he had his portrait taken to show us. It was a faint shadow of him, his eyes blinking with the long exposure to the blinding light, and looking for all the world as if he had been put up against the wall to be shot, a flat, thin picture, but it explains why to this day Daguerre gets the credit of being the inventor of photography—he was the first to show us how *we* were to be seen, how the human subject comes out of the process, while the other discoverers had only shown us the outer world. The self-importance of mankind is such that no exploit can have the importance to each of us that a revelation of ourselves has, and it is still the case that the immense majority of the world cares only for photography in portraiture. The curiosity to have a scientific record of the outer self, something which could not be impeached, is still stronger than the desire to see the further end of the darkest Africa. Who cared if Talbot had succeeded in fixing the landscape before? Nobody cared how the landscape fared, or if he did, it was only the artists who perhaps wondered how much it might interfere with their prospects or how much it might help them—to have one's self or one's other self, one's friends or one's heroes, on the drawing-room table was far more important than Switzerland and the Rhine and all the outlandish world together. The photographic portrait was the first thing which roused the attention of the entire civilized world of all the series of discoveries connected with photography.

Years after, it must have been when I was about fourteen and all my leisure was devoted to painting, a daguerreotypist came to my native town and I made his acquaintance, got behind the door of the dark-room a little, and elaborated a way of coloring daguerreotypes in water-color, and there is somewhere in the family to-day one of the "doggrytypes," which I then tinted representing myself palette in hand with the palette set with all the colors I knew how to use.

I lost sight of the subject for many years, except for now and then sitting for a daguerreotype, until Fredericks brought the negative process from Paris to New York. He went into

partnership with Gurney, and there is or ought to be somewhere in the connection one of the first paper photographs he took after opening the new business, a portrait of myself. It was, maybe is, on plain paper and when I last saw it was unchanged. Fredericks copied one of my first exhibited pictures, a severe study from nature, and for the joke of the thing one of my friends passed it off on the artists as a photograph from nature, and without difficulty. The process did not attract me and I stuck to my painting single-mindedly, till one winter I caught a pneumonia in a visit to the Adirondacks in the winter, arriving in a fearful snow storm, and when I got out of it I was sent off to Florida. It was only for a few weeks, and as I was weak, I concluded to do nothing in the way of painting but to take up photography as a means of bringing back records of the vegetation. I went to Black, of Whipple and Black, of Boston (I was then living in Cambridge), and he put me through the process in two lessons of half an hour each. How kind he was, the dear old fellow! I took half a dozen negatives across the roofs of Boston, bought a whole-plate box of the old kind, a telescoping arrangement with one slide, a Jamin lens of Benjamin French, a long focus portrait combination, a gutta percha bath and a lot of glass and chemicals. Agassiz charged me with photographing the plants and at the same time with a couple of huge cans of alcohol to put natural history specimens in, and off I went by steamer to Savannah and so up St. Johns River (this was years before the war) and I settled at Hibernia, a farm house owned by Col. Fleming, who took boarders in the winter time. Here I rigged up a sort of dark-room but the disastrous effects of nitrate of silver soon turned me out of that, and I made a tent of two thicknesses of black cotton with one of white outside of it. This went on four stakes driven into the ground, and I got on my knees before it, and putting my head and shoulders into the open side and gathering the drapery about me, managed, as my collodion rapidly got red and slow, to get a very clear plate when the dust did not interfere.

I knew nothing about acid baths or litmus paper. The bath was made up in Boston, 40 grains strong, and as I used it up I made up the quantity with river water and went on without the slightest suspicion that that was not the thing to do. The results which I brought back were mostly of the most positive kind, for there were but two which would give a print. One was an alligator, which beast then abounded in the St. Johns, and which I photoed under peculiar circumstances.

Young Fleming and I used to be a good deal of the time on the river, and as I was a fair rifle shot we used to cruise for the great lizard. But to kill a 'gator is not always to bag him, for the most of those I shot, being hit in the head, were killed and went down, to be picked up some days after by some innocent passer-by, innocent at least of their deaths, robbed of their teeth, and eaten by the turkey-buzzards. This one I hit at the base of the brain, and only stunned him, and then got a harpoon in him before he came to, and we towed him home, dead by reason of having another bullet perpendicularly through the brain. We dragged him up on the shore and disposed him in the most natural attitude in the blazing sun, and I got my camera and photographed him, when the dinner bell rang (one o'clock P. M.) and we went to dinner. I went out after dinner to drag him into the shade to skin him, when the outer skin, the epidermis, stripped off in my hands—he was superficially parboiled where the sun had fallen on him. But the negative was intense enough to print. I got a lot of rattlesnakes, copperheads, moccasins and other reptiles, with birds and fish of various kinds, everything in fact that would go in cans and started homewards in the end of April with my photographs packed in their boxes with no more precaution than if they had been going from Boston to Cambridge, and found half of them smashed when I got back, but the cans of reptiles were all right, only the boatman found out that there was spirit in the cans and drank most of it before we got to Savannah. Arrived at that delightful old city, I made the acquaintance of a local photographer who was doing a good business in portraits but had no apparatus for landscape, and we concluded to make a series of views of the famous old cemetery near the city. He took the precaution of examining my bath before we went out and found that I had worked it down to 17 grains to the ounce. How I had got anything but fog, I have never understood, except that the accumulation of iodine in the collodion, and consequent acid in the bath, overcame the alkali that must have been added in the river water. The lesson was an expensive one, but it was effectual, and I used the same outfit with good results in the Adirondacks the summer following; the first photographs taken, so far as I know, in that section, then little known to the tourists; but when I got back I dismissed photography as too cumbersome for my uses.

Years afterward having been disabled from painting by a brain trouble due to overwork, and being then consul at Rome

and just appointed to the consulate of Crete, I was getting up my outfit, when a wandering English amateur who happened at Rome with the last and most perfect lot of photographic fixings, had the luck to smash his glass portable bath in transportation with the double result of mixing the bath solution with everything in the package, and disgusting him with the wet process, so that he sold out at a very reduced price everything he had except a Dallmeyer triplet. The dark-box, a huge affair which was so arranged as to serve as a packing box for everything else, and which, when it was where one wanted it and in position, was a very convenient article, was bought by Anderson, a then famous photographer of Rome, and I bought the camera, an 8x10 Kinnear, the *ne plus ultra* of that day, of portability and economy of time in getting into position. It was a clumsy thing, and required about five minutes to set up, but when packed it was portable. With a 15 inch landscape lens, a gutta percha upright bath of home make, and a dark tent of my own contriving, I was fitted out, and the interval before starting for my new destination was employed in experimenting on the new dry-plate processes, Taupenot, tannin, honey preservative, R. M. Gordon's, etc. I subscribed in fact to the *Photographic News*, and tried everything that was published, and the number of new dry processes of those days was amazing.

Arrived at Crete, on the verge of civilization, with nothing to do but send a report to the Secretary of State every three months, the fascination of photography took full possession of me, and for the next four years I did little but experiment and photograph the country round as far as the insurrection which broke out the year after would let me explore it. Painting dropped out of consideration, the more as I was always exposed to a pot-shot from the Bashi-bazouks who were prowling about the country with full liberty to fire at anything that looked Christian.

This rather limited the range of my journeys in the interior, especially after being fired at twice, and gave me ample time to study the art that is in photography by making the most of a limited range of subject and improving my apparatus. I went out on a long excursion one day and when I had got an hour from home on horseback, I found that the screws of my Kinnear camera were on the shelf at home and I had to ride back and get them. I decided on the spot to invent a camera which should have no loose screws but should always have all its parts in position. As there was not a cabinet maker in the

island, I got the carpenter of the British man-of-war on the station to help me, and taking part of the brass work of the old Kinnear, with the bellows, some pieces of teak which the Captain gave me and a lot of old cigar boxes I made the first camera which was hinged together and kept all its parts in their places at all times. I made a careful working drawing of it and sent it to London to have it made properly but one of the best known camera makers after keeping it a year sent it back saying that it could not be constructed! But he brought out in his next year's novelties a new camera which embodied the essential principle of mine of folding and keeping in place the parts and it had a great success. It was not till I went to London two years after that I had my model carried out properly, and then I had difficulty in getting it made. The conservatism of the English workman is amazing! I took the drawings to George Hare, who is on the whole the best camera maker I have ever found in England and he told me that it could not be made to work; on which I had to show him my clumsy home-made machine to convince him that it had been made and worked. He put it on the market and it had considerable success; but the egg having been made to stand on end, it was followed by imitations and modifications which were mostly easier to make and as my swing-back bothered the British genius, the imitations which were not in all respects improvements, gradually crowded it out of use. My original camera was in the form of a book and the base board folded up on each side and protected the works, making a box quite self contained. The swing-back is still I believe the best.

Settling in London, of course I was in the full swing of all that was being done in photography. I joined the most delightful club I have ever known, the Photographic Field Club, which used once a month to meet on some chosen picturesque locality of English soil, and after having roamed and ravaged the country for miles around made its rendezvous at the village Inn, and had a "meat tea" before taking the last train back to London. Of the delightful meetings of the Field Club I shall cherish the recollection while I have the memory of things earthly preserved to me. Where are they all, the good fellows who came to the call of the meet? Our fiery discussions over our tea, the amicable contests of plates of our own making, the lessons taken and given in deportment as well as in photography—shall we ever forget them? Plunged into journalism, politics, literature; in the midst of adventure as a special war correspondent, journeying in countries almost as unknown as

central Africa, oppressed by death and disaster, what may almost be called a fighting life has little by little driven photography where photography drove painting, till I have but the fag ends of odd days to give to either; but now the really exciting part of photography is gone—the commercial plate-maker and those who "do the rest" have taken the interest out of research and there is no longer any mystery of manipulation to give us the excitement of discovery. We old fellows can talk of the days of experiments and triumphs of amateur devotion to the progress of the processes of photography, but it is as old sailors in the Sailor's Retreat talk of battles and voyages no more to be renewed; as African travellers may tell of the discoveries now become school-book common-places. That life is lived out.

The garrulousness of old men overtakes me and I must check myself. But it is interesting to note that in the distinct recollection of a man still using photography is included every step of the actual application of the discoveries, in making light do the recording of all visible facts of interest to science or society. I remember the astonishment of the scientific world at the discovery which enabled the sun to give us our own likenesses and I have seen photography the toy of children, the commonest pastime of all classes and ages.

W. J. Stillman.

REPRODUCING SEA WEEDS IN CYANOTYPE.

Some little time ago it was my good fortune to secure a couple of volumes which may be reckoned unique in character. The contents of the said volumes consist of reproductions of the various British algæ, and were the hand-work of a Mrs. Atkins, who for the purpose made use of Sir John Herschel's process to which he gave the name of "Cyanotype," now more commonly designated as the "blue process." The original mounted specimen duly named at the foot had evidently been laid down on the glass plate of an ordinary printing frame, and the sensitized paper thereafter placed in position, the result when finished showing the details of the sea weed white on a blue ground. The interest of the work—photographically and otherwise—was sufficient to warrant me in bringing it before the notice of the members of the Glasgow Photographical Society at the opening meeting of last session. Since then the communication I made has been printed *in extenso* and having been further asked to contribute to the volume of proceedings

a cyanotype reproduction of a sea-weed by way of illustration, it has occurred to me that the mode I adopted for securing the requisite number of prints actually required—considerably over 1000—and the manner of treating the sea-weed itself, might not be without interest to the readers of the ANNUAL, some of whom may wish to try their hand at a similar photographic reproduction. To commence then with the plant itself.

In order to get a sufficient number to print from at one time I chose one that is somewhat common with us on the West Coast of Scotland, the scientific name of which is *Ptilota Plumosa*. The specimens secured were floated on fresh water and when nicely spread out a piece of clean white paper was immersed underneath, and by carefully lifting it out of the water the position of the fronds, etc., was maintained. Two wooden boards had previously been obtained, each a little larger than the paper on which the weeds were to be dried. Laying a piece of thick blotting paper, or rather a piece of what is known as "drying board," on one of the pieces of wood, the paper with weed affixed was placed on it and above it a piece of the absorbent paper.

This mode of procedure was gone on with till a sufficient number of specimens had been obtained, and on the whole the second wooden board was placed, a heavy weight being placed on the top. I found no difficulty in getting the weed sufficiently dried by means of a second and similar operation, of course replacing the damp blotting paper by dry. The specimens after drying were removed from their original support (I should perhaps mention I used a thin tracing paper which prevented the weed from adhering) and transferred to a somewhat stiff tracing paper on which had been duly printed the botanical name of the sea-weed. To keep the plant in position I used a thin solution of rubber in benzol, gum or paste having been found to produce cockling of the paper. The specimens were now laid face down on the glass of a large printing frame capable of receiving a sheet of paper of the size known as "antiquarian;" a little of the rubber solution sufficed to hold each piece of the tracing paper in its respective place in the frame. Eighteen prints of the sea-weed were thus made at one time, each one having the printing of the original reproduced in clear white characters. The paper used was the ordinary ferro-prussiate of commerce. No development was required; a simple immersion and washing in water sufficed to bring out the picture. The particular

Negative by Miss Emma S. Needles. Kurtz Process.

THE WAYSIDE FOUNTAIN.

brand which was furnished me was of continental make, a peculiar feature of which was that the intensity of the blue ground gained immensely in strength by exposure to light and air, so that the printing in the first instance did not require to be carried to the same extent as I had often found previously required to be done when development was resorted to by means of a ferricyanide solution.

Wm. Lang, Jun'r, F. C. S.

THE SAFE LIMITS FOR RAPID EMULSIONS.

Most of the difficulties that arise in the production of "rapid emulsions" are chiefly due to a want of accurate information of the laws or conditions that promote or decrease sensitiveness, and a neglect of strict attention to details.

It is of course obvious that a badly constructed formula can never produce good results, but it is equally true that the most perfect formula in inexperienced hands will give equally unsatisfactory results, and it frequently happens that a good formula receives a bad name, simply because it is improperly managed. In such cases the conditions controlling the changes which make or mar sensitiveness are imperfectly understood, overlooked, or pushed to *dangerous excess.* The temptation to force rapidity by over-heating or excess of alkali is one which, when yielded to, is largely responsible for many failures, and is, unfortunately for the amateur, too often recommended in working formulas. There is a fairly wide range of freedom from the danger point of foggy and decomposed emulsion, within which trustworthy authorities may differ, but the general conditions governing sensitiveness and density remain the same. These conditions or laws have been slowly worked out since the days of Madden and Burton, so that at present we stand upon a pretty firm basis of recorded facts, and all honor is due to the names of Abney, Vogel, Eder, Henderson and others for the fulness with which they have published their results. It is possible that manufacturers, who as a rule retain the results of their large experience, may have special methods which they regard as valuable business secrets, but they are all founded upon the same general laws, which when carefully studied and observed will give to the amateur equally satisfactory results.

It is proposed in this article to invite the reader into the field of *safe limits* circumscribed by the teachings of expe-

rience and marked by inflexible conditions which may not be violated without danger of failure.

In so doing we shall not place too much reliance upon "formulas" grain for grain and ounce for ounce, but rather concentrate the attention to that which is of more importance viz.: the conditions and limits of sensitiveness upon which success depends.

"A freshly precipitated bromide of silver in a gelatine solution is but slightly sensitive, and requires a certain treatment to induce ripening. When mixed at 60 deg. F. its *immediate* degree of sensitiveness is less than that of an ordinary wet collodion plate. By long standing, by heating, by the addition of alkalies, the sensitiveness may be increased from twice to one hundred times its original degree." In these few words, a free translation from Dr. Eder's last edition, 1890, of "Photography with Bromo-silver Gelatine," we have the key to all the knowledge that we really possess upon this intricate subject. If now we were able to subject these apparently simple factors to definite mathematical rules emulsion-making would be a very certain and easy matter, but emulsions defy mathematics; the conditions are so numerous, so subtile and so interchangeable that the most carefully repeated calculations give us but little material aid and it is only by prolonged observation and experience that the errors of early experimenters have been eliminated and the safe methods and limits for high sensitiveness determined. We say "*Safe limits*" because it may be set down as an axiom that *all agents and methods that increase sensitiveness tend finally to the decomposition of the silver bromide and the destruction of the emulsion.*

Furthermore, high sensitiveness brings with it certain unavoidable evils chief of which is a loss of density, or thinness. As sensitiveness increases density decreases in a constant but not accurately known ratio. A very dense plate is never extremely sensitive, but it does not follow that a thin plate must be very sensitive, as an overforced emulsion will give but little density, and also but little sensitiveness. Bearing these elemental facts in mind and assuming that *eight fluid ounces* is a convenient and safe quantity for the amateur, let us proceed to form a skeleton upon which we place known facts and derive from them the best proportions for a formula. We will work according to the *combined method of heating and subsequent alkaline digestion.*

This method is chosen because it illustrates all the factors involved in emulsion making, and also because according to the

writer's experience it gives when properly worked within "safe limits" the best results. It is decidedly more difficult than the ammonio-nitrate method to which many give the preference; even Dr. Eder in his fourth and last edition has completely reversed his opinions, and now states his preference for the ammonio-nitrate of silver method which he condemned as inferior in his second edition. The writer still affirms after repeating Dr. Eder's formulas that the combined method here selected gives more uniform and better results.

The necessary chemicals are *Test-paper* for acid and alkali. *Potassium bromide*, *ammonium bromide*, *potassium iodide*, *acetic acid*, *water of ammonia*, *gelatine*, *distilled water*.

The *potassium salts* must be chemically pure, free from *chlorides* and *alkaline carbonates*.

The *silver nitrate* must be "C. P." and *neutral*.

The *acetic acid* must be *glacial* 100 per cent.

The water of ammonia must be of uniform and constant strength.

The stronger water of ammonia, U. S. P. 26 deg. Baumé, containing 26 per cent. ammoniacal gas with density 0.9078 can always be obtained.

All the *water* used in *mixing* the *chemicals* must be distilled and form no opacity with the silver nitrate. The water for the final dilution of the emulsion and washing the same may be ordinary drinking water.

The *gelatine* must be of *medium* hardness (preference is given to Heinrich's for this method) and before using freed from all extraneous organic matter which tends to produce fog in cooking.

It is "*safe*" and advisable to soak all the gelatine needed for *cooking* in water containing one-eighth of one per cent. of 100 per cent. glacial acetic acid (say one minim to two ounces of water) for three hours, then wash thoroughly in running water to remove acid, and spread out on a clean sheet to dry. Gelatine thus prepared is freed from all injurious organic matter, its resistance is not impaired, and it will not, within the *safe limits* prescribed, produce fog.

Proportions.—Here authorities differ widely but the "safest" proportion for potassium bromide and silver nitrate is certainly that established by Dr. Eder, viz.: four parts potassium bromide to five parts silver nitrate, and three parts ammonium bromide to five parts silver nitrate.

It is "safe" to convert two-thirds of the silver nitrate by potassium bromide and one-third by ammonium bromide. If

one-half of the silver nitrate is converted by potassium bromide and the remaining half by ammonium bromide the result after cooking is but slightly less sensitive, and certainly less liable to fog. If potassium bromide alone is used the result is very slightly more sensitive, and within the prescribed limits fog never ensues.

Concentration.—The concentration of the emulsion exercises considerable influence upon sensitiveness. A 7 to 10 per cent. emulsion ripens rapidly, a 2 to 5 per cent. emulsion ripens very slowly. Over-concentration (exceeding 10 per cent.) produces granularity and requires an excess of gelatine, which latter diminishes sensitiveness.

A "*safe*" proportion is 8½ to 9 per cent. of silver bromide, or what amounts to nearly the same thing of silver nitrate, which will give for 8 ounces of emulsion 326 to 346 grains silver nitrate. The solution of silver nitrate should be 22 to 23 per cent. *circa* 110 grains to the ounce. The amount of *potassium iodide* may be safely one-fiftieth of the silver nitrate, giving six grains plus, and for every grain of potassium iodide added, deduct an equal amount from the potassium bromide. The iodide can be increased to eight grains with safety.

The amount of *distilled water* for the salts of potassium and the initial gelatine is the remainder after the silver has been dissolved. It will be not far from three ounces for the silver nitrate, 5 ounces for the salts and gelatine.

The percentage of gelatine for the cooking is very important. Too much retards sensitiveness, too little favors the formation of caseous, granular, heavy, insensitive silver bromide. Authorities differ widely in this respect. Eder goes as high as 10 per cent., which seriously retards sensitiveness. Burton uses a fraction of a per cent. which is equally disastrous. A safe limit is 1½ to 2 per cent., giving *circa* 50 to 76 grains to 8 ounces emulsion. In the limits assigned to this paper it would be impossible to discuss the reasons for settling upon this proportion—except to state that they are founded upon a fairly large experience.

Acidification.—The emulsion must be *faintly* acid. Test both silver and potassium salts solutions. Dilute *one* drop of the acetic acid with nineteen of distilled water, add drop by drop, stir thoroughly, and test after each addition until test paper shows a *faint rose red.* A fraction of a drop usually suffices. Over acidification usually destroys sensitiveness, neutral solutions may fog.

Mixing.—Temperature and *time* of mixing exert decided influences upon sensitiveness. *Safe limits* are 140 deg. Fahr. for the salts and gelatine, and 120 deg. for the silver solution, the mean after twenty-five to thirty minutes mixing will be 130 deg. for the emulsion temperature provided the vessels have been kept warm by being surrounded with hot water; 132 deg. should not be exceeded.

Boiling.—It is now transferred to water at 212 deg. Fahr. The *time* of cooking must be sufficient to raise the emulsion temperature (130 deg. to 132 deg.) to 210 deg. to 212 deg., and *keep it there exactly thirty minutes.* Over-boiling forms caseous bromide of silver. After a certain point ripening by boiling practically comes to an end, and digestion with alkali must be substituted. The "*safe limit*" is *thirty minutes* after 210 deg. and *no longer:* twenty minutes gives a good result.

Cooling.—Cool in running water, *without shaking*, to *circa* 110 deg. Fahr., pour off the emulsion from the caseous bromide in the bottom of the vessel.

Digestion.—The decanted portion is cooled to *exactly* 95 deg. Fahr., the safe limit for *alkaline* digestion.

The ammonia liquor is then added and the whole thoroughly shaken. *2 per cent. ammonia is the "safe limit" for digestion.* Say for 8 ounces the exact *maximum limit* is 76.80 minims, then *70 minims* is a very safe limit and even 60 minims will give a good result. *Avoid forcing at this stage by an excess of ammonia.* Dilute the ammonia with 2 volumes of distilled water before adding.

Time of digestion.—The digestor, conveniently a large wooden pail, must contain at least 2 gallons of water at *exactly* 95 deg. F. Room temperature 70 deg. F., or nearly that. The digestor must be well covered with blankets and emulsion digested 2½ hours. 3 hours is the maximum, 2½ hours the "*safe limit;*" *avoid over digestion.* The final gelatine has been soaked and melted and temperature reduced to 95 deg. F. It is now added to the digested emulsion and setting begins.

Method of setting and time.—These are of prime importance and probably have as much influence upon the result as any of the preceding factors.

The setting vessel must be of such dimensions that the emulsion will rise to the height of *one half inch*, when all is poured out.

It is now placed level on ice and covered so as to retain the ammonia and kept there until firmly set. The cover is then removed and the emulsion kept at 55 deg. F., the safe limit, for

20 to 30 hours according to the sensitiveness required. During this stage sensitiveness slowly increases. Tests can be made every 5 hours by removing a portion, washing very thoroughly, coating, and exposing without drying the film. 24 hours including the time of setting upon ice will be found a safe limit. It must be remembered that here as elsewhere when a certain point is reached sensitiveness begins to decline. Too long a time produces granularity and thinness, without any compensating gain in sensitiveness and the gelatine becomes softened to the point of frilling.

A recapitulation of "safe limits" will show that sensitiveness is gained in four successive stages, viz., mixing, boiling, digestion with ammonia, and setting with ammonia and in *every* stage forcing is positively avoided. The combined result when the "safe limits" are rigidly observed is uniformly good. To a number of esteemed readers of the "ANNUAL" who have asked for "Formulas for Rapid Emulsions" the writer begs leave to present for an answer this humble attempt to inculcate the principles upon which formulas may be properly constructed, assuring all that if they work within the "safe limits" the result will be satisfactory.

R. E. Van Gieson, M. D.

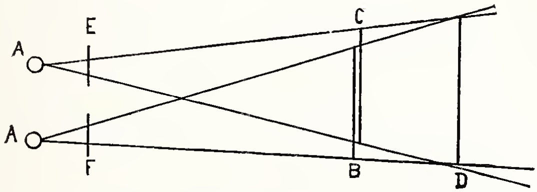
CHROMATIC STEREOSCOPY.

THERE is nothing connected with the science of optics more wonderful and pleasing than the stereoscopic phenomena, and as nearly all the pictures used for their manifestation are produced by photographic means, and the whole thing is so closely connected with photography, anything new in relation to it will be of interest to the readers of the ANNUAL.

Chromatic stereoscopy has lately come to the front as a new means by which the solid or stereoscopic effect can be obtained. In the way usually employed the two pictures mounted side by side are viewed separately by the two eyes, and, by the refracting power of lenses placed between them and the eyes, are made to appear out of their real position to such an extent that they overlap each other and appear as one, but by the chromatic method the two pictures as transparencies can be mounted in contact face to face, or can even be printed one on top of the other on the same surface.

In order to fully understand the rationale of the new process, let us perform a simple experiment. Take two slips of gela-

tinized glass, and on one paint a round spot with transparent red color, and then paint a spot of the same size and shape on the other piece of glass with equally transparent green. Viewed by transmitted daylight through red glass, the red spot becomes invisible as the clear glass around it appears of the same red tint; but the green appears as a black mark on a red ground. In the same way, viewed through green glass, the green spot will disappear and the red be seen as a black mark on a green ground.



A A—eyes. B—red figure. C—green figure. D—apparent position of the figure as seen by both eyes. E—red glass. F—green glass.

Now mount the two pieces of glass, face to face, so that the two spots will come within a sixteenth of an inch of overlaying each other. With the naked eye the compound figure appears black where the spots overlap, as the green and red unite in preventing light of any kind from passing through. At one side of the black a narrow crescent-shaped section of the red color is seen, and at the other the same of the green. But if we view it with red glass over one eye and green over the other, each eye will see but a single round black spot, but not exactly in the same position that the other eye sees it. Unconsciously the eyes change their angle of convergence and bring the two images together apparently as one. As the eyes judge of distances by the varying acuteness of the angle of vision, and this is now changed by artificial means, the spot as seen by the two eyes will appear to stand out in space either behind or in front of the plane on which it is really painted; as for the white background one eye sees it as green and the other as red, and the brain perceives it as a mixture of the two, or white. This, then, is the basis of chromatic stereoscopy. By following well known geometrical rules, a great number of different figures can be made in this way, that will stand out with perfect solidity and relief. Red and green are not the only colors that can be used in this way, as the writer in his experiments has had equal success with the complementary orange and blue.

Dr. E. Schobbens, of Antwerp, has applied the principle in the production of steroscopic solidity on the lantern screen, an effect never before satisfactorily obtained. He reproduces the two stereoscopic pictures in transparent pigments of the proper colors, and projects them, by strong white light, into the same disc on the screen; the spectators view the picture through spectacles of red and green glass, and of course the desired effect can be seen. But there are many disadvantages connected with showing lantern views in this way, and after all a much greater amount of atmosphere and perspective solidity can be seen in the single picture, when projected from a good lantern, by following Sir David Brewster's simple advice and viewing it with but one eye. If you have never tried this, do so, and you will be surprised at the result.

Dr. Schobbens mentions as one of the principal difficulties in the practical application of his lantern process, that all persons who are color blind in one or both eyes, are incapable of seeing the effect, hence this is destined to become of great use as a test for that defect of vision. Sets of geometrical figures can be prepared, of different pairs of primary colors, as above described, and the ability of the subject to tell whether they stand out or sink back when viewed through the proper colored glasses, can be taken as a perfect test of his ability to see colors in their proper values.

I would suggest that everyone who has the time experiment in this line for himself, and perhaps he or someone else can discover other applications for the principle than have been here enumerated. *J. Will Barbour.*

THE ACID FIXING BATH.

It has long been known to photographists that an acid added to the hypo fixing bath would very effectually counteract the staining of the negative by pyro. A serious drawback is that when added direct to the hypo bath, the acid separated sulphur, made the solution milky, and eventually rendered the negative opalescent. To overcome this difficulty, other ways of adding the acid to the fixing bath had to be found.

Prof. Alexander Lainer found when a solution of sulphite of sodium with citric or tartaric acid is added to the hypo bath till a discharge of sulphurous acid becomes perceptible, the whole solution remains clear, separates no sulphur, and makes a permanent fixing bath that is excellent, notwithstanding its strong acid reaction.

At first it was proposed to acidify the ordinary hypo bath in a round-about sort of way. Acid was added to a sulphite of sodium solution 1:4, sufficient to produce the reaction described above. The acids used were citric, tartaric, and in America sulphuric acid had been recommended by Wm. Bell.

When the acid fixing bath had shown its several merits, Prof. Lainer proposed to add the acid bi-sulphite of soda lye direct to the hypo solution in the form we now use it.

The following formula for those who use the commercial article is recommended:

LAINER'S ACID FIXING BATH.

Hypo solution 1:5	1 liter
Acid bi-sulphite soda lye	50 c.c.m.

The acid bi-sulphite of soda lye is a commercial article, and is sold by the Scovill & Adams Co.

To those who are not able to easily procure the commercial article, I would suggest the following bath which virtually answers the same purpose:

EDER'S ACID FIXING BATH.

Hypo 1:5 or 1:4,	1 quart
Tartaric acid 1:2	6 drams
Sulphite soda 1:4	2½ ounces

Mix the last two solutions, and then add them to the hypo. Should a more energetic bath be desired, add one ounce of the acid solution to 2½ ounces of the sulphite solution, and add this to the hypo solution. Still the tabulated formula is energetic enough for all practical purposes.

I first saw directions for preparing the acid fixing bath with the acid bi-sulphite of soda lye in the supplement to the *Photographic Times* of Feb., 1890. It struck me it would be a most convenient bath to use, since the claim made for it then was, that it would keep indefinitely and fix any number of plates.

I began to use the acid fixing bath shortly after the formula was mentioned in the *Photographic Times*, and have continued to use it ever since. I have fixed numbers of plates in the same bath, and I do not now remember one that had any trace of pyro stains.

The first bath I used several months and then threw it away, because, in it, the last plates fixed very slowly. Had I known it at the time, I could have filtered it, restored the efficacy of the bath, and removed the insoluble salt, (sulphide of silver, Ag_2S).

I do not, however, believe in economy with hypo. If the hypo solution were used but once for each negative, it would cost then but a small fraction of a cent to fix each one.

I am now satisfied the acid fixing bath will fix a negative so long as any hypo remains in the solution.

Before using the acid fixing bath I frequently had considerable trouble with pyro stains; under the dim light of the ruby lamp I never could tell by inspection whether the negative had been sufficiently washed or not. Then I used a clearing bath composed of citric acid, chrome alum and water. This helped wonderfully, hardened the film, but at the same time made the process of fixing slow.

With this treatment I occasionally got pyro stains; now I never get them. I have discarded both the clearing bath and the alum bath; I never use them now in connection with the acid fixing bath.

In the acid fixing bath no frilling whatever takes place, and I have developed plates in the hottest kind of weather. For a long time I was uncertain whether the acid bath prevented frilling or simply controlled it. I had, however, observed that the gelatine film had the same feeling to the finger when rubbed over it that may be noticed after a negative has been immersed in an alum bath. I now firmly believe that it does prevent frilling, and I am borne out in my views by the *The Photographic Times* (No. 447, page 171), and by Prof. Charles Ehrmann.

Plates slightly under-exposed and developed with the potassium oxalate developer will have the detail very much brought out when fixed in this bath.

In this article I do not consider it necessary to give further details concerning the acid fixing bath. It will answer all purposes, I think, to simply summarize its main features.

This bath always remains perfectly clear, no matter how many negatives are fixed in it, which is not the case with the ordinary hypo bath. The latter soon becomes turbid and unfit for use. It removes stains caused by pyro or other developing agents, from the negative. It adds detail to an under-exposed potassium oxalate developed negative. Fog caused in developing is wholly removed by long immersion. Transparencies and negatives turning yellow with age, can in many cases be restored to their original clearness by bathing them in this bath for half an hour to an hour. Long immersion of an over-developed negative will reduce it. Frilling does not take place. It can be used over and over again. It

produces a crisp, clear negative, transparent in the deepest shadows. It is convenient; it is economical.

With all its virtues it has one drawback, though not a serious one. Negatives fixed in the acid bath do not respond readily to the reducing action of potassium ferric oxalate combined with hypo, nor to Farmer's reducing fluid with ferricyanide of potassium. This, however, is a small matter.

Use the following formula instead:

Belitski's Acid Reducer.

Water	7 ounces
Potassium ferric oxalate	2½ drams
Crystallized neutral sulphite soda	2 drams
Powdered oxalic acid	30 to 45 grains
Hyposulphite soda	1½ ounces

The solution must be made in the order given; filtered, and kept in tightly closed bottles in subdued light.

This reducer can be used over and over again, and keeps well for months. With repeated use its activity is not diminished, because the oxygen that had parted from the ferric salt in favor of the silver is replaced by absorption from the atmospheric air.

The acid reducing fluid tans gelatine films.

Reducing a negative, fixed in the acid fixing bath, with the acid reducing fluid may be called the *similia similibus curantur* treatment. *S. F. H. Hewit.*

THE ARISTOTYPE.

Aristotype paper has, within a comparatively recent period, acquired great popularity in this country, and its merits are so manifold that it is surprising that it did not sooner command the favor of the photographer. My attention was first called to aristotype paper about four years ago, when I received a few sheets from Germany, and the prints which I made at the time convinced me that its advantages over albumen paper were many and important. Since then I have used it continuously with most satisfactory results. It is only within about a year that this printing paper is manufactured and on sale in this country, and while the American product does not equal its European prototype in many particulars, it is nevertheless an article of great merit offering many advantages that are especially appreciated by the amateur.

True aristotype paper consists of a collodio-chloride of silver emulsion upon a paper substantially coated with a chalky sub-

stance, which prevents the emulsion from soaking into the paper. Its salient qualities are great rapidity in printing and toning, and the capacity of yielding satisfactory prints from thin negatives. A further advantage is found in its keeping qualities, which are much more pronounced with the German paper than with that of domestic manufacture. I have had imported aristotype paper in my possession for nearly two years and found it at the end of that period to be substantially without discoloration, as rapid in printing and as reliable in toning as it was when quite fresh. What a change from fresh albumen paper which becomes utterly useless a few days after it is sensitized.

The tones which may be obtained upon aristotype paper are sufficiently varied to satisfy the most exacting taste; rich brown, purplish black, absolute black and all the intermediate gradations are most easily secured in the gold toning bath with acetate or phosphate of soda, the latter yielding most beautiful results. Platinum, uranium and lead baths may also be employed, giving most artistic tones.

The imported aristotype paper is susceptible of a further application which opens to the amateur a new, or at least little travelled field of activity, giving opportunities for the display of artistic taste and mechanical ingenuity without limit.

I refer to the production of enamels and porcelain pictures, in short, to its use in photo-keramic work. With the exercise of some patience I find it not difficult to separate the aristotype emulsion after printing, but before toning, from its substratum and to transfer it to any smooth, hard surface in substantially the same manner as the Eastman transferotype paper. After the transfer has been made upon a proper porcelain the transferred print is toned in a toning bath having for its basis gold, platinum uranium, or manganese, or a combination of several of these, according to the ultimate color sought to be obtained, and after fixing, washing and drying it is ready for firing. The results are often very beautiful.

The principal objection to both the domestic and the imported aristotype paper is its cost, although when we bear in mind that on account of its keeping qualities little or none need be wasted as is the case with fresh albumen paper when the day selected for printing happens to be cloudy, the actual difference between the cost of aristotype and albumen paper is but nominal.

But there is no good reason why a first-class aristotype paper should not be put upon the market at as low a price as albumen paper.

The American aristotype is made upon imported paper, hence the increased cost. The paper could as well be made here if the manufacturer were convinced that it is to his interest to produce it, which it no doubt is.

In conclusion, a suggestion as to a practical method of keeping prints from your negatives. Mounting them upon cards results in a collection which soon becomes too bulky; mounting them in portfolios entails considerable expense. I have found it convenient, and very satisfactory to proceed as follows:

Prints after toning, fixing and washing are squeegeed upon ferrotype, hard-rubber or ground-glass plate and before they are quite dry the backs are smoothly coated with a good mounting medium. A piece of somewhat stout unbleached cotton goods, slightly smaller than the print is applied to the back of the print and rubbed on smooth; the picture will come off the plate, evenly and securely mounted upon the cloth. After trimming, the prints are now in condition to be preserved in a suitable receptacle, or to be subsequently bound into a veritable picture book, which is practically indestructible, and will take many more prints than an album without becoming bulky. *Louis B. Schram.*

PORTRAITS BY THE LIGHT OF AN ORDINARY WINDOW.

It is occasionally desirable to make portraits at the homes of our clients, and having had considerable experience and greater success than I had believed possible, I thought others might be interested in a description of the method used. I will premise by stating that I have taken in this way bust cabinets fully equal to my best work in the studio.

The first step is to cover the entire window with tracing cloth or other translucent material, oiled tissue paper, or ground glass, the object being to obtain a diffused light. Cut off, by a dark or drab curtain, the lower part of the window, until when the subject is seated on a low seat the light does not fall too strongly on the eye. Next have a frame made about six by eight feet and covered with bleached muslin. This frame is to be suspended over the window, projecting the long way into the room. Fasten the side next the window to the top of the casing by a hinge, so that the frame or reflector may be inclined at any angle by means of a cord and pulley. This arrangement is a substitute for the skylight. Now with

a reflecting screen you will be able to light your sitter in a surprisingly effective manner. With a *light* drab background made in a swinging frame so that it may be inclined at any angle, you can get any shade of background you desire from white to nearly black. Do not work too closely to the window. If your window is large you may make successfully full figures. The time with a Cramer 40 sensitometer plate and a 3 B Dallmeyer lens averages from 5 to 10 seconds.

My experience inclines me to the opinion that there is usually too much top light in our studios, especially for bust work, and I also believe that a single light eight by ten feet in size and only slightly inclined, say, ten to fifteen degrees, would be preferable to the studios of ordinary construction for bust work. I think the amateurs will fully appreciate the hint conveyed in the above remarks, and the professional need only try it to be convinced by the beautiful results obtained.

L. G. Bigelow.

FOR RESTORING OLD COLLODION.

Pulverize a small piece of cyanide of potassium very fine, take a small amount of the powder and drop into the bottle of old collodion, shake it thoroughly, adding a very little at a time (shaking thoroughly each time), until it changes to straw color; filter, and it is ready for use.

R. J. Reese.

ON TESTING LENSES.

How many photographers would think themselves competent to give a critical opinion respecting the optical performance of a large astronomical telescope? Yet the testing of an astronomical objective is much simpler than that of a photographic one, and they do not hesitate to write certificates respecting the latter after merely looking at the brass work and taking one or two negatives; apparently forgetting that most negatives will scarcely show the difference between a first-rate lens and a very ordinary one.

In an astronomical objective it is only necessary that the corrections for spherical and chromatic aberration should be perfect, but in a photographic one all the following conditions should be fulfilled

1. The chromatic aberration should be corrected for actinic rays.

2. The spherical aberration should be corrected for actinic rays.

3. The objective should have an angle of view of from sixty to ninety degrees.

4. It should focus actinic rays sharply over the whole extent of the plate.

5. It should give a picture free from distortion.

6. The illumination should be uniform upon all parts of the plate, without any trace of flare spot.

7. The intensity ratio should be as great as possible, ranging from one-half in the quickest portrait lenses, to one-twentieth in the most extreme wide angle ones.

8. The chromatic aberration should be corrected for visual rays.

9. The spherical aberration should be corrected for visual rays.

10. The visual image should be sharp throughout the whole extent of the plate.

11. The visual and actinic foci should coincide.

As many of the qualities here specified are incompatible with each other, photographic objectives are necessarily a compromise, and although they have been brought to a wonderful degree of perfection, if they were subjected to the same tests as astronomical telescopes their inferiority would be instantly apparent. The production of lenses which will yield negatives capable of passing a careful inspection with the naked eye sufficiently taxes the skill of opticians, and photographers seldom apply any other test. Few of them have either the technical skill or the apparatus necessary for critically examining their lenses, but the following hints may be of value in roughly estimating the performance of these instruments:

(*a*) Definite information respecting the corrections 1 and 8 is obtainable only by spectroscopic methods which photographers cannot ordinarily apply. In photographing stars the rapidity of an objective is largely dependent upon the perfection of the first correction.

(*b*) If the lens yields a negative which is sharp over the entire plate when examined through a magnifier of about $2\frac{1}{2}$ inches focus, the conditions 2 and 4 are sufficiently fulfilled.

(*c*) The angle of view included by a lens can easily be

measured thus: Mark upon the ground glass the size of the plate which the lens is intended to cover. Place a large piece of paper upon a table, and set the camera on it. After focusing upon some well-defined distant object, bring the image of that object to the mark upon the ground glass defining one side of the plate, and then mark the position of the camera upon the paper by drawing a line along its side. Next, turn the camera until the image of the distant object is brought to the line upon the ground glass defining the other side of the plate, and again mark the position of the camera by drawing another line upon the paper. The angle included between the two lines thus drawn will be equal to the visual angle of the lens, and it may be measured by an ordinary protractor, or in any other convenient way.

(*d*) To most photographers the only available method of testing the 5th condition will be to rule a series of squares upon a large sheet of paper, and after photographing it, to examine the lines upon the resulting negative. If they are perfectly straight and equidistant upon all parts of the plate, the image is free from distortion; but if not, both the kind of distortion, and its amount, will become apparent. It is usual to claim that the best symmetrical doublets will cover a plate 60 degrees square, and certain wide angle lenses a plate 90 degrees square, without distortion; but in truth no lens has yet been made that will give a negative more than about two degrees square sufficiently perfect to admit of exact measurement for astronomical purposes.

(*e*) For the 6th condition there can be no better test than the inspection of a negative taken with the lens to be tried. When the light is weak, and the exposure long, any inequality in the illumination of the plate produces an exaggerated effect upon the density of the negative.

(*f*) In the "Year Book of Photography and Photographic News Almanac for 1870," page 33, the late Mr. J. H. Dallmeyer gave an accurate method of determining the intensity ratio of a photographic objective, but the quotient obtained by dividing the aperture of the front lens by the focal distance of the combination will be a sufficiently exact value for most purposes.

(*g*) If the image upon the ground glass of the camera is sharp over the whole field when examined through a magnifier of about $2\frac{1}{2}$ inches focus, the 9th and 10th conditions are sufficiently satisfied.

(*h*) At the present day most cameras are so constructed that

Negative by W. Kurtz, Madison Square, N. Y. Kurtz Process.

A PORTRAIT STUDY.

when the plate-holder is inserted the sensitive film comes into precisely the same position as was previously occupied by the roughened surface of the ground glass. When that is the case, if a sharp negative results without making any change in the focus after adjusting it upon the ground glass, the 11th condition is fulfilled.

In the early Daguerreotype days there was a considerable interval between the visual and actinic foci of even the best lenses. To measure it a printed sheet, covered with large letters, was set up before the camera in such a way that its top was considerably farther from the lens than its bottom, and after focusing upon a line near the middle of the sheet, a picture of it was taken. When the picture was developed some other part of the sheet was usually found to be much sharper than that actually focused upon, and by measuring the distance through which the lens had to be moved from its original position in order to bring the letters best defined in the picture into focus upon the ground glass, the interval between its visual and actinic foci was ascertained. The error was corrected by thinning the front of the plate-holder sufficiently to bring the sensitive film exactly to the actinic focus when it was inserted in place of the ground glass after the latter had been adjusted to visual focus, and then the difference between the two foci gave no further trouble so long as the proper plate-holder was used with each lens. If some of the modern detective cameras were examined by the process just described, it would become apparent that lenses with actinic foci have not yet gone entirely out of use.

The corrections which we have numbered 1 to 7 affect the perfection of the negative, and are therefore of vital importance, while those numbered 8 to 11 affect only the convenience of the operator. In commercial objectives an effort is made to secure all these corrections, but in the very perfect lenses required for astronomical purposes only the 1st, 2d, 4th, and 5th are attempted. To illustrate the tremendous difference between the commercial standard of accuracy and the scientific standard, we have only to recall the fact that a wide-angle lens of four inches equivalent focus will yield a negative five inches square which an ordinary photographer will declare to be perfect, while to obtain a scientifically perfect negative of that size, astronomers find it necessary to use a lens of thirteen inches aperture and eleven and a quarter feet focus.

Wm. Harkness.

ANATOMICAL PHOTOGRAPHY.

The value of the camera in recording the gross appearances of organs in anatomical and pathological study is becoming yearly more fully appreciated; the small number of thoroughly satisfactory photographs of such subjects which one sees, however, shows that the conditions of success for this class of work are often imperfectly understood. An extended experience leads the writer to offer a few suggestions in the hope that they may aid those undertaking this line of work.

The primary object in view, is to produce if possible, an exact reproduction of the specimen; to this end advantageous conditions must be secured, involving:—

1. Suitable apparatus; 2. Proper lighting; 3. Favorable condition of the specimens.

A suitable lens, giving the best possible definition, is a necessity. Since it is usually desirable to reproduce specimens of natural size, unless excessive dimensions forbid, the question of faithfully representing all planes of the object becomes an important one, especially in specimens, such as opened hearts, etc., where details lying in widely separated planes must be shown with uniform sharpness.

A rapid rectilinear lens, of sufficiently long focus, and a small stop are the means of overcoming these difficulties. While other lenses, no doubt, yield equal results, the Beck "Autograph" lenses answer so admirably for these purposes, that they deserve especial mention. The rapid rectilinear No. 5, (8x10) for ordinary preparations, with, additionally, the No. 3 (5x8) for smaller objects, forms an excellent selection; as a rule the smaller ($\frac{f}{45.2}$ or $\frac{f}{64}$) stops should be employed, whereby all planes are rendered perfectly sharp.

The disadvantage of lenses of long focus, when images of natural size are desirable, is the long pull required, the ordinary cameras of moderate size failing to meet these demands. The improved copying cameras (8x10), made by The Scovill Company, answer very well for anatomical work of all descriptions, and leave little to be desired.

The shifting front, carrying the lens, supplies an important adjustment for centering the image, without disturbing the specimen. The inconvenience of transporting such a camera is an objection of little weight, as preparations are usually photographed in one particular place, while the solidity of the apparatus is a distinct advantage. To attempt to reproduce in natural size, objects of considerable dimension with a lens

of short focus, is simply to produce a distorted and scientifically worthless picture.

The risk of vibrations renders excessively prolonged exposures objectionable, particularly in those cases where the specimen is suspended. The increased exposure necessitated by the use of small diaphragms can be overcome by the selection of a rapid plate; many comparisons have demonstrated the excellence of the Seed plate for just such work, these plates yielding, when judiciously developed, negatives at once brilliant and plucky, and full of detail and half-tones.

Suitable lighting of the specimen is another point of importance upon which much depends. A diffused top light, falling slightly from in front, is generally the most satisfactory, and may be obtained indoors from a suitably placed skylight with northern exposure. Where the convenience of a skylight is wanting, an admirable substitute may be obtained readily by transferring operations to the open air and working in the shadow of a favorably situated wall, or under a canopy of thin muslin, the latter especially affording an excellent illumination for such work. The length of exposure under such conditions of outdoor lighting is, of course, much less than that sufficing in ordinary laboratories provided with skylights; the exposure within doors, with stop $\frac{f}{45.2}$ and "Seed—26" plate, and normal developer, seldom being less than one minute.

The condition of the specimen to be photographed also materially affects the results. The most favorable time to photograph anatomical specimens is after they have been in preservative fluids for a sufficient time to become of a very light buff tint, the chalky white of old bleached out specimens, or the dark-red or browns of many fresh tissues, being alike unfavorable for the preservation of delicate detail; in those cases where decided contrasts of colors exist, with minutia to be preserved in each, orthochromatic may replace the ordinary plates with decided advantage.

The reflections from smooth surfaces, especially when moist, are a continual source of annoyance, particularly so when occurring in fresh specimens of a dark general tint. Where permissible, in view of the character of the specimen, careful drying of the reflecting surface, or the application of suitably colored powder, will do much to lessen the production of the unsightly chalky patches of high-lights. The plastic effect, frequently so desirable, may often be secured by saving detail in deep shadow by throwing additional light from a mirror upon the depressions or dependent parts of the specimens during the exposure.

The best results are obtained, by fixing, where possible, the specimen to an upright board, covered with black, by means of large, stout pins, some two or more inches long; these may usually be so placed with care, as to show very slightly, if at all, in the photograph.

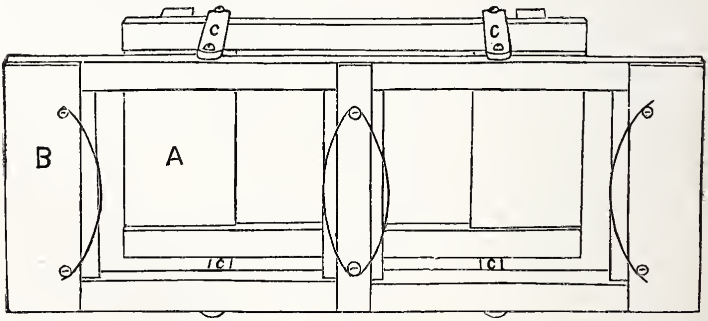
In those instances, where, from the delicacy or peculiar character of the tissue, the specimen must remain in the horizontal position, and, not unfrequently, in fluid, a frame supporting the camera in the vertical position has proved more satisfactory than reflected images, since in the latter method some loss in definition is unavoidable.

George A. Piersol, M.D.

A SLIDE-CARRIER FOR SINGLE LANTERNS.

In common with all who have made use of the "single optical lantern" I have felt the need of a slide-carrier that would give something of a dissolving effect, and avoid the unpleasant procession of views across the screen, which results when the slides are pushed through the grooved carrier in the ordinary way.

The following piece of apparatus is one that I have devised and used in my own lantern; it is easily constructed and operated, still I do not put it forward by any means as the "coming single dissolver."



By reference to the cut it will be seen to consist mainly of but two parts.

1st. The base "A," which is secured to the front of the lantern, as close as possible to the condenser, in any convenient way.

2d. The carrier proper "B," having places for two slides which are dropped into position from above, and held in the recess by light wire springs on each side.

The carrier is attached to the base and swings to the right or left by means of four arms, C, C, C, C; the length and position of these arms is such that by swinging the carrier to the extreme limit in either direction, the slides are brought alternately into the proper position and focus before the condenser.

The cut shows the carrier when swung half way around; of course when a slide is in position at the condenser, the opening before which it is placed will coincide with that in the base, and both carrier and base will be in close contact.

The effect produced on the screen in changing from one slide to another, is to throw the first picture out of focus, while it is at the same time displaced to the right or left, and the succeeding view comes in from the same direction, and drops promptly into correct focus and position.

This carrier cannot conveniently be applied to some forms of lanterns, its use interferes also with completely enclosing the space between the slide and the objective, although the little light that is diffused from this source is practically of no consequence.

The material used in the construction of my own is mahogany, but any description of well-seasoned hard wood will answer.

The dimensions of the principal parts are as follows: Length of base, 8 inches; width of base and carrier, $4\frac{1}{4}$ inches; length of carrier, $11\frac{1}{4}$ inches; the top and bottom rails of both base and carrier are $\frac{1}{2}$ inch by $\frac{3}{8}$ inch in thickness; (the $\frac{1}{2}$ inch side of the rails shows to the front in the cut); the width of spaces to receive slides is $4\frac{1}{8}$ inches, and the distance between these spaces at the centre is $\frac{1}{2}$ inch; the length of the arms "C" between the centres of pivot holes is $2\frac{5}{16}$ inches. The arms may be made of hard wood, but are better of sheet-brass $\frac{3}{8}$ inch by $\frac{1}{8}$ inch.

The cross pieces on the base are $1\frac{7}{8}$ inch wide by $\frac{3}{16}$ inch thick, and are let into the rails until they are flush with the surface of the latter; on the carrier the cross-pieces at the ends are $1\frac{1}{4}$ inch wide and the one at the centre is $\frac{1}{2}$ inch. All are $\frac{3}{16}$ inch in thickness, and are put on the front of the rails, and a facing of the same thickness is put on the bottom rail to form a stop for the slide; three thin pieces are then placed in at the back, so as to form rebates to keep the slides in position.

The arms "C" are pivoted to the carrier at the exact centre

of the recesses in which the slides are to be placed, the location of the corresponding pivots on the base can then be readily found.

Care should be taken in placing these to avoid any twist in the whole apparatus, and insure smoothness and freedom in working.

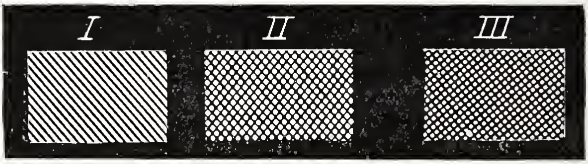
It will be found an advantage to place a paper washer, well blackleaded, under each arm, at the pivots.

Thos. Kennedy.

LINE PLATES FOR HALF-TONE ZINC ETCHINGS.

After a series of long-continued experiments I have been able to prepare line plates for the reproduction of photographs in half-tone by zinc etching, with one exposure and with one line plate only.

In the following cut No. I. represents a simple system of



parallel lines, requiring double exposure, as is well known. The proportion of lines to the interstices is the most favorable to the process I have been able to find.

No. II. is specially destined for one exposure only. It has been frequently said, that by printing two single line plates in opposite directions upon each other, the same effect can be had, as making but one exposure.

No. III. is a proof of a tint produced in this manner.

Experience has convinced me fully, by working with such plates a great many irregularities are encountered, especially so in the lighter portion of the picture.

With my line plate No. II. such faults are not likely to occur, and with it the effect produced is the same as results from double exposure of a single line plate.

The difference of shape in II. and III. is easily recognized. To produce a cross-line plate like No. II., make a print of cross-line plate 3 directly upon zinc by the asphaltum method, or with bichromatized albumen. The plate is then subjected to one etching only, and during the time the process is going on

a large and soft brush is moved uninterruptedly in circles all over the plate. Etching must be deep enough to round off the edges and corners of each individual square. When the form of each interstice has attained to that in No. II. etching is interrupted, and the plate may be printed from. Plates of the largest dimensions can be composed from smaller ones prepared in this manner.

I will be pleased to show samples of my work, made with No. II. half-tint to all those interested in the process, and beg of them to take notice of my offer in another part of this volume. *Adolph Tuerke.*

PICTURE MAKING.

Among the hundreds of photograph views which one sees exposed for sale in every large city, how very few have any merit, or show any artistic knowledge in the one who made them, or even seem to be the result of an attempt to make a *picture*, rather than a mere photograph! This ignorance of the pictorial possibilities of a view, is not confined to professional photographers, but extends well into the amateur ranks, predominating in its greatest degree in that class of photomaniacs who should be called "Pushbuttonists," they are too well known to need describing here: I dare say however, that these latter have some excuse for their ignorance on this subject, as they seldom see how a view looks on the ground glass, and as a rule give their plates to some professional to develop. In this way they lose the chance to take advantage of two of the greatest opportunities for improvement in artistic perception that photography offers.

There is always a best place from which to see every view, and it is this place which all who make photographs should try to find, or failing in this let them not make the view but come again another day, perhaps a slight change in the light is what is needed, or it may be that the eyes having become wearied cannot see the view as they should, and need the rest of a day or two to enable one to recognize the best position to make it from. This is a rule which every photographer should conscientiously follow, and should do all he could to fit himself for following it. Pictures cannot be made by rule, yet there are a few simple rules which apply to every picture, that are easily learned, and once understood go far toward making the photographer an artist. It is not always advisable to go deeply

into the principles of art, familiarity with a few of the most important is all that is necessary.

There is in every picture a "point of superiority" between the centre and the side, where an object appears to its best advantage. It is on one side or the other of the centre, but never on both.

This point is about one-third of the width of the picture from its side, and it is there that the principal object in the composition, be it animate or inanimate, should be. There the story of the picture should be mainly told. Neglect of this one simple canon of art ruins more photographs than any other one thing.

I have seen pictures of buildings in which the whole centre of the picture was taken up by the building, and very often it is a square front view at that. Many of these would have given good enough results had the photographer placed his camera a little to the right or left and brought a corner, a bay window, or some other marked feature of the house near the "superior point" of the picture, and at the same time contrived to get the building in perspective. It is also one of the fundamental principles of art that parallel lines should be shunned as much as possible, as being harsh and unpicturesque. Lines that recede and converge are always more agreeable. When one can choose his subject, it is best to avoid straight lines as much as possible, for while they are just what is required to complete some compositions, they are dangerous playthings for the inexperienced, who would much better be content with curved lines for a while at least.

In being obliged to meet demands as they occur, I am well aware that photographers cannot choose those subjects that will compose best, and will often have to contend with the most rigid, straight, and parallel lines, but they can do much to destroy this severity, if they will endeavor to get them in perspective.

There should always be a point of contrast in every picture, to accentuate it. In many cases it may be used to good advantage to balance the composition. This is easily accomplished by introducing in the foreground, on the opposite side of the centre from the principal object, a small bit of light in a mass of shadow. A light-colored stone, or a clump of flowers on the grass or against a patch of dark-green weeds are usually accessible, if the view be out of town. If in the city, figures may be introduced for this purpose, if nothing else is at hand. I have seen a miserable-looking, rusty, old ash-can, with a

crumpled piece of paper showing in relief against it, serve an excellent purpose in this respect, and once I remember carrying an old tomato-can several blocks, because it was the only bright object I could find for contrast in a particular view I had to make. Of course, the can was so placed as to disguise its shape and nature.

In some views, particularly where there is water in the foreground, this contrast should be dark against light, as a black boat, buoy, or a bit of floating rubbish on the white water. Sometimes a bunch of dark rushes will work in nicely, by slightly moving the camera to one side.

These few rules are all that are necessary to know as a beginning in the art of picture making, with the camera. They are easy to remember and apply, and the endeavor to do so will bring its fruits in the improvement shown in the work of the one who tries them

Harry Platt.

REFLECTORS.

Although light is the mainspring of photography, it is not a little surprising with how slight a knowledge of the subject photographers, or at least many of them, manage to practice the art.

The subject is much too large for even the most superficial treatment in an article for the Annual, and so I shall confine myself to one small branch, reflection ; or rather the use and abuse of reflectors.

No doubt, in a general way, the average photographer knows that light is reflected from a body at the same angle at which it reaches it—the angle of incidence; but, so far as my observation goes, not one in a dozen makes a practical use of that knowledge. Those who visit the studios may, again and again, see the photographer, who thinks he could not get on without a side reflector, place it on the dark side of the sitter, but *parallel with the light*, so that the great bulk of the light that reaches it, does so in straight lines, at right angles to the surface, and is consequently sent straight back again, without reaching the sitter. A little practical application of the knowledge of the law of incident reflection will show that the proper place for the side reflector is a little, or a good deal, as the case may be, in front of the sitter, and the side nearest the camera turned towards the side light, until such an angle

is obtained as will send the rays, or as many of them as may be desirable, direct to him.

The abuse of the reflector, however, is more manifest and objectionable in connection with the optical lantern. In theory, as well as in the best practice, the rays from the source of light fall on the condenser and are by it refracted and sent forward in a converging form to the objective, by which they are sent to, and focused on the screen. It will be evident that when the source of light is a point, or as nearly so as in a well managed oxyhydrogen light, the rays will reach the condenser at the same angle, and all come to a point at the same place. When, however, the source is large, as in the popular three, four or five wick lamps, the rays reach the condenser from distances varying two or three inches, and consequently at various angles, and enter the objective in a state of confusion and only a certain portion is brought to a focus on the screen, the others greying the image and materially lessening its brilliance. The application of a reflector, while it may send more light to the screen, at the same time very much increases the confusion, as the rays from it fall on the condenser at all sorts of angles, limited only by the relation of the size of the reflector to that of the condenser. If this be true then, it will be evident that the only suitable reflector is one that will send the rays, not to the condenser, but back to the source from which they came; and as there is, so far as I know, no reflector in the market that answers to that requirement; those supplied to optical lanterns should be either removed, or blackened.

One other absurd abuse of the reflector is found in all at least that I have ever seen supplied and used with hanging wall lamps. The ordinary so-called kitchen lamp may be taken as a type. It consists of an ordinary kerosene lamp with a one or two inch wick and glass chimney, arranged to hang against a wall. Between the wall and the light is placed a concave reflector, the centre of which is on a level with the flame. The result is that the rays are sent in a converging form, and brought to a focus at a distance depending on the depth of the concavity, and while it hardly, if at all, increases the general illumination of the room, it blinds the eyes of those who pass across the line of projection. The fact is that those reflectors are *silvered on the wrong side;* for if the convex side was turned to the flame, the light would be distributed all over the room where it is wanted, instead of being brought to a point where it is not. *John Nicol, Ph. D.*

THE HAND CAMERA IN THE WOODS.

I HAVE just returned from the bush, far up the St. Maurice River, which enters the St. Lawrence at Three Rivers, Province of Quebec. Wishing to get a few views as well as fish, I took a Waterbury Detective with me—for this reason amongst others, that it has a focusing glass and shields—so that with a light tripod, it can be used either with the roll-holder, plates or films, as best suited for what is desired. This is especially valuable where one is travelling in such country, for often the camera cannot be used off hand, for the want of light, it may be from dark weather, a deep glen or any other cause. I took a number of canoeing scenes, making "portages," shooting small rapids, lake scenes, etc., and found great pleasure in using the camera. I confess to several failures, from haste chiefly, for the Transparent and American films I used, were simply perfect.

Failures in a few cases arose from bad light, but every photographer has such, and in spite of what I see stated by some writers that all hand camera work is trash, I find that after getting used to the work, fine pictures can be made from using the finder carefully and not being in too great a hurry. I speak, not of yachting or street scenes, but regular landscape views, such as I had to take on this trip. Going and coming the principal journey I made has seven "portages" besides one of four miles long, which with a canoe to be carried, provisions, blankets, etc., for three men for a week or more, takes as long out of a summer day as is convenient and any picture must be done quickly or not at all.

I brought home many undeveloped views and have just finished them—using eikonogen, sometimes plain, and oftener with a third of hydrochinon, the former made after a formula in *The Beacon.* I fancy that eikonogen is best for fast work and the mixed developer where there is plenty of exposure. I generally use a little old developer also.

There is one thing I can recommend to any going into the woods, and that is to use tin japanned boxes for carrying cameras, etc., which must needs be kept dry. I have used such for many years. The one I had for the Waterbury Detective was made simply with an easy cover of about two and a half inches deep, so that no rain could creep up the sides, and two pieces on sides of box to hold the strap, that it could not slip off. In going over a large lake we were caught in a storm of rain, I really think the heaviest I ever saw, the water rising in the canoe where I was sitting in a few

moments, yet the tin box kept my things perfectly dry. Leather cases are good on railways, etc., but for rough work give me tin. Always use a padlock to prevent the effects of curiosity on films or plates. I know a case where only one plate was saved from a long winter journey of 320 miles in the lumber woods, they having been meddled with in the absence of the owner. The padlock staple through two holes in the strap, which should always be around the box, is a good arrangement.

Alexander Henderson.

DEVELOPMENT—ITS FALLACIES AND LIMITS.

It has been stated, and over the name of a French scientist, who was probably not much of a photographer that, no matter how short the exposure, the plate receives a full depiction of the subject, and that only the inability of the developing compounds to bring to view the hidden details, leaves them masked—but they are on the plate!

This statement, though evidently made in good faith, reads like a clever bit of sarcasm in parodying the great mass of photographic writing which should never have been written, emanating as it does so often from overheated imagination and entire lack of careful and precise observation and experience.

Your enthusiast is full of "dodges," eager to prove something out of nothing to show what remarkable results can be attained by doing something or other—that only adds doubt and perplexity, and to point out royal roads where only simple lanes and by-ways can exist and lead.

All this appals the budding photographer just as he should be really progressing, and makes mystery where all should be plain, to his discouragement and weariness.

If only half this sort of writing were devoted to the absolute proof of the simplicity of modern photography, so far as it relates to the ordinary amateur, and the exposition of the certainty of success following upon plain and well-defined rules, how great the relief and encouragement.

Facts are stubborn things, and the photographer who "knows it all" is a fact and a stubborn thing. And he never shows his full results! He will exhibit his one perfect negative, which was, perhaps, beyond his power to spoil, from all the circumstances of its existence being in his favor on occa-

sion, and the amiable amateur who has been pursuing the even tenor of his way, with seldom varying happy success, is his prey. The beauty of the negative came from his marvelous way of developing, doing this first, adding that after—and the victim falls. He gives up his simple methods and thereafter knows no peace.

One thing is certain in photography as in all things, patient labor will be repaid by success, and success, beautiful, satisfying success will crown the patient photographer who persists in working within well-defined limits, freeing his mind from the fallacies that confront him so frequently.

It may sound heretical, but it would be better a thousand times were the results of false exposures thrown aside as soon as made evident, than forced into the unsatisfactory and disheartening results that only retard true progress and deter the maker of them from discovering the reason of his poor negatives, and beginning all over again.

There is no more dangerous fallacy than the trusting to treatment in developing for the correction of errors in exposure. The *only* perfect negative, under ordinary circumstances, is to be produced *only* by the right exposure and development. The development *worked up* to the exposure, and *not* the exposure made for the developer.

Learn to expose properly, and the development becomes a simple, rational process, easily guided and controlled. Turn a deaf ear resolutely to the pernicious teaching that you may expose without regard either way to a few seconds more or less and control the matter in developing, and compare an average run of negatives made by the average photographer in both modes, and study the results.

As there are fallacies, so there are truths, and it may be taken as a very positive truth that there is a limit to which a plate can be developed and that no more is to be gotten out of a plate than is on the plate.

Many a weary amateur working disheartedly over his developing tray would go on with renewed energy if he were only made aware of this, and took the unction of its truth to his soul. All the dodges and all the compounds in the world will not bring up from the under-exposed plate the detail that is not there, more may be obtained in the hands of one man than another with less patience and experience that will give a better print, but not enough for the fullest satisfaction. Certain

"dodges" may *shorten* development, but they will not give the detail so often claimed, whether of treatment or of chemicals.

It is not so long ago that it was stated in one of the most reputable photographic magazines and by quite an authority, that soaking the plate in water before development would make an instantaneous exposure equal to a full timed one, another has stated that only the best results can be obtained in developing by keeping the plate perfectly still and not rocking it. How many pit-falls have these statements dug, and how many plates have they spoiled? How many have attempted to gain a hoped for local density in their negatives by dipping a brush in the developer and painting bits of them during development, and how many have fallen in the pit? Yet this fascinating and fallacious statement still makes its appearance, equally with the converse of the proposition, to paint locally with the alkali of the developer to bring up under-exposed portions. In the one case you but renew the flagging energy of the developer in the dissolution of the addition to its entire amount, and in the other you but push—with great risk of fog—small portions beyond the balance of the plate for a moment.

Preparing three or four different tray-fulls of varying proportioned developers to dip the negative in the wild attempt to develop it somehow by hit or miss, is but to add perplexity to mystery. On the other hand one-solution developers are as erroneous and misleading.

There is no use in creating difficulties for the sake of overcoming them. Developing is an exact science, and an art, and it may be acquired without becoming a scientist, if the art is mastered. Once acquired the ease and simplicity of it is as wonderful as the results.

Patience is the one grand factor, going slow the secret of success in development.

It is not within the province of this article to give the usual infallible recipe, but only the general outline of the method of develepment that will produce the best results, not accidentally, but regularly. A few simple facts may be premised. The simpler the developer in its constituents the better; very concentrated developing solutions from which drops must be measured should be banished for general use, the developer should be in separate solutions, and the same formula should be persisted in until mastered, for with this comes success. The use of bromides should be dispensed with as far as possible,

but if necessary, only bromide of soda should be used with potash and soda developers.

Always immerse the plate in the normal pyro solution first, allowing it to remain for a couple of minutes while gently rocking the tray to ensure an even covering of the plate, then add about a third of the alkali solution and still gently rock. If you should have slightly over-exposed and this brings out a faint trace of the highest lights, be very patient and simply add a little more water to dilute the pyro, and keep on gently rocking until the developer seems to lose its power, then add another fraction of alkali and patiently push the developing to a conclusion. If the first addition of the alkali does not produce any effect on the plate after five or six minutes, add a little more, but a little, and keep adding a little at patient intervals until the development is started when you may now finish more quickly, the plate having become thoroughly penetrated with developing solution. By pursuing this method, no restraining bromide is necessary, you are supplying it by the restraint of your developing, and all parts of the plate come up beautifully even and regulai in their proper gradations. Details in the shadows have time to be coaxed out by this purely natural method without undue developing of the lights.

Instantaneous exposures made on bright days of well lighted subjects will come up in their shadows also by this treatment, but it is hopeless to expect anything but an apology for a good negative by any treatment whatever of a subject photographed instantaneously in a poor light on a dull day.

It is not to be forgotten with all this that subjects light in themselves require a little less pyro or other developing agent than dark subjects, and the greater or less proportion of the one or the other in any view should govern the whole development.

In reality the entire matter of successful development resolves itself into this simple treatment, whatever the developer, taking for granted the amateur's fair knowledge of the other stages of development after the plate has been carried through its first and chief nursing. Given a fair, even exposure the development will become almost mechanical, and the slight modifications rendered necessary by varying exposures and the lights and shadows in varied subjects will come intuitively by practice and the mastery of the first simple rudiments persevered in.

H. Edwards-Ficken.

A WRINKLE IN COPYING.

We often have tintypes to copy that come to us badly bent and cockled up so that they give numerous high lights where they don't belong. To get rid of the reflections caused by the ridges that come by bending, I have devised a water tank with a clear glass face—it may be any convenient size—fill with clean water; in this put your T. T. The plate will at once appear perfectly level and can be copied without showing any inequalities. All who have card photos to enlarge know how rough the grain of the paper shows. Plunge the card to be copied in the water tank and nearly all the grain will disappear. The tank may be made of anything that will hold water with a clear glass face. Mine is made of tin 5x7 inches, one-half inch thick, painted inside black (any color will do), with a groove on one side to lay a glass in and putty it in so it will not leak. I have never seen this in any publication, and it is a useful thing; worth many times the cost of the Annual.

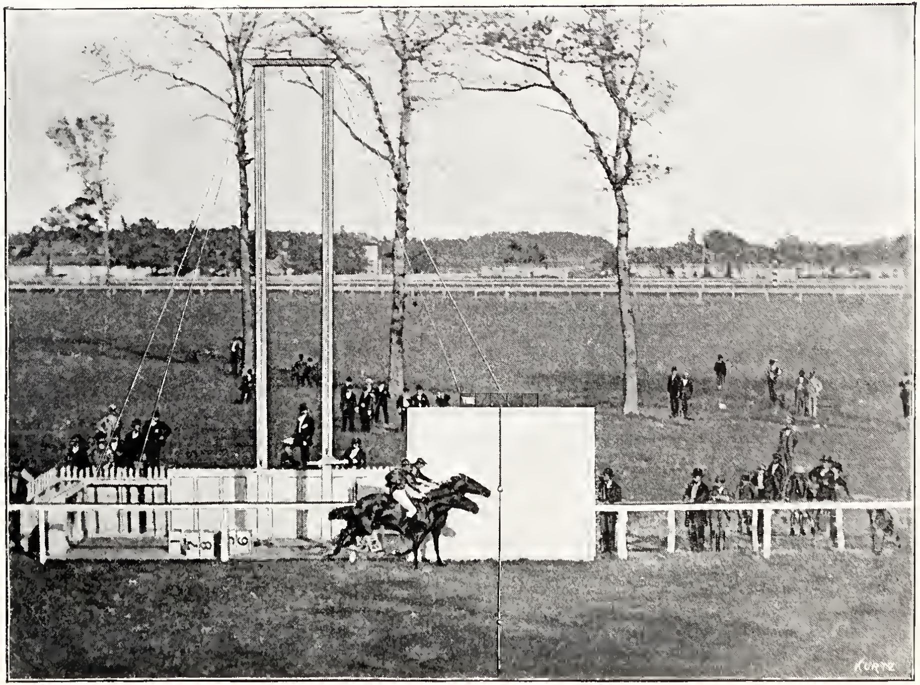
A. Hesler.

PHOTOGRAPHY APPLIED TO SPORTS.

I sometimes wonder whether Daguerre ever dreamed to what a vigorous growth his child would attain. He may have done, for doubtless he saw that its possibilities were well-nigh illimitable. Still, had photography never gone beyond its collodion days it would never have been one-tenth the service to man that it has been since the introduction of the dry-plate.

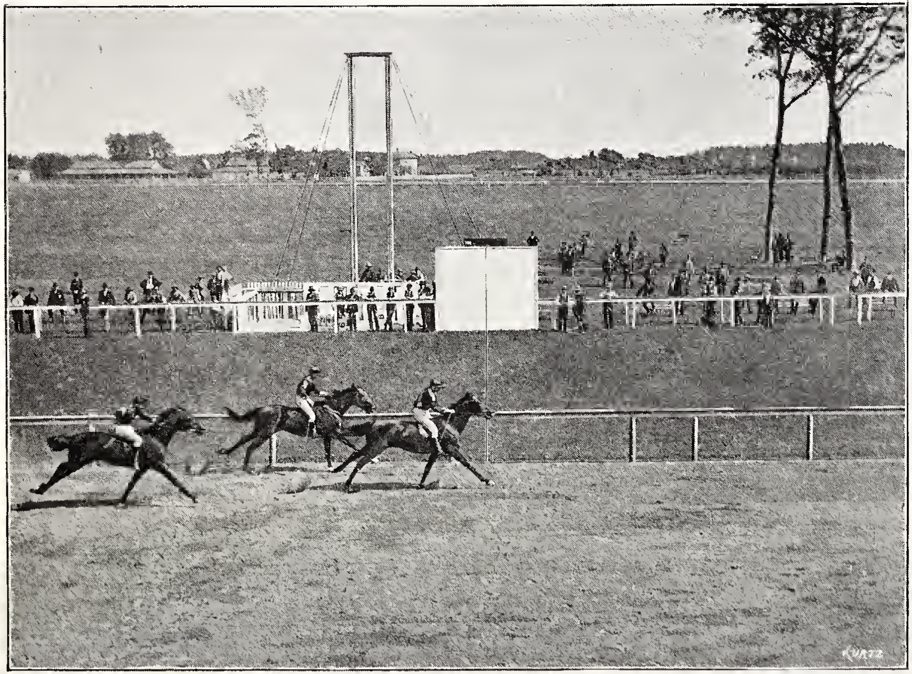
It is not for me to speak of the new worlds that it, the dry-plate, has opened up to us; the new industries that it has brought into existence; or the correction of the thousand-and-one errors it has effected; that has all been done by abler pens than mine, so I shall limit myself to a few remarks on the particular branch of the art that I follow, "Instantaneous Photography as Applied to Sports."

Photographing the finishes of races, as an aid to the judges, and to prevent the possibility of a wrong decision is, I believe, the latest phase of its existence, as I am not aware this was ever done until my appointment as Official Photographer to the Coney Island Jockey Club at the beginning of the Spring Meeting. Several times during that and the Fall Meetings has it proved itself useful—nay, almost indispensable—for finishes were made that the judges found it impossible to say certainly



Negative by John C. Hemment, Brooklyn, N. Y. Kurtz Process.

FINISH BETWEEN TARAGON AND ST. LUKE.



Negative by J. C. Hemment, Brooklyn, N. Y. Kurtz Process.

LA TOSCA.—19½ Yards per Second.

which was the winning horse. My plate had no such difficulty, for it showed beyond the possibility of error the exact position of each horse the instant they reached the line.

There has been at different times a good deal of dissatisfaction expressed at the decision of the judges in close races. Handicapped as the human eye is by a certain slowness and persistence of vision, it is not safe to trust at all times to its evidence. The photographic eye has no such limits. Objects passing within its range of vision for only the fractional part of a second are accurately impressed upon the sensitized plate —the photographic brain—leaving a record that we may examine at our leisure of such attitudes and positions as we had never imagined horses (for instance) could get themselves into until we saw them so registered. How the actual positions of the limbs of a swiftly running horse differ from their apparent positions may be seen at a glance by comparing instantaneous photographs with paintings and drawings of the same objects by skilled artists.

Some of the positions running animals assume appear ridiculous to us, accustomed as we are to the more artistic attitudes given them by our painters. Still they are the true positions and as such deserve study. Of course, I don't wish to say that artists should copy our photographs, yet they are well worth their study. But I am digressing.

As I before remarked, much dissatisfaction had been expressed at different times at the decision of the judges in closely contested races. When there is but an inch or two difference in the position of two horses as they reach the winning post, one must be directly opposite with another post intervening to enable him to say exactly which of the two horses is foremost, and any one standing far to the right or left of the judges' box will see one or the other horse ahead according as he stands himself. Therefore there arose a demand for a more infallible arbiter than the most accurate judge who ever awarded a race. Nor has this demand remained unjustified, for on several occasions the judges have awaited the development of my plates before posting the winning numbers. A glance at the illustrations accompanying this article will show how close the finishes often are.

Of course to make the work of practical value the exposure has to be made at the instant the nose of the first horse is on the line, and that is where the difficulty comes in. The eye and hand must be equally alert; the nerves must be strong and the head clear. Nor will anything less than the most perfect instruments procurable serve. The lens must give a

well-defined picture when used with its full aperture, and it must be especially constructed for rapidity : so with plates and shutter. I have two cameras of the "detective" genus, one a 4x5 Scovill Company's ordinary make and a 5x7 made for me by the Scovill Co., from suggestions of my own. Both are fitted with R. & J. Beck's R. R. Lenses which, after experimenting with the lenses of various other makers, I have found to suit my purpose best. I also use a special rapid shutter constructed for me by the Prosch M'f'g Co., and Cramer's lightning plates, and neither shutter nor plates can in my estimation be beaten. Perhaps more depends on a perfect shutter than on any other one thing, for the image must be sharp and clear, easily distinguishable by the number on the jockey's arm, and by his colors. When I say that my pictures of these horses going as they do at a speed well-nigh incredible only 60 feet distant from me, and broadside on, are as sharp and well-defined as though they were stationary, I can say nothing further in praise of the apparatus and plates used. This branch of photography is still in its infancy, but in my opinion the day is not far distant when an official photographer will be attached as an indispensable officer to every racing club and athletic association in the country. More than that, the great daily papers will keep a photographer on their staffs, for illustrated articles are an important feature of latter-day journalism. Thus photography has not gone to the dogs, altogether, in fact it has a great future before it. It has a great mission to fill in educating public taste, and in establishing beyond doubt the existence of truths that have been regarded as mere hypotheses.

The first illustration accompanying this article shows the finish between Taragon and St. Luke, the former winning by half-a-head. Several other races were as closely contested, but this has been chosen as a fair example of the work to be done, and as evidence of the need of photography on the track.

The last illustration, while not showing such a close finish, serves to call attention to the speed with which the work must be done. Millionaire Belmont's chestnut filly, La Tosca, ridden by Hamilton, ran over the Futurity course, short six furlongs in length, in 1 min., $8\frac{2}{5}$ secs., thus traveling at the almost incredible speed of about $19\frac{1}{2}$ yards in one second. Any one with a taste for mathematics may calculate for himself the speed of a shutter that will open and close the lens quick enough to take a photograph of such a rapidly-moving object as though it were standing still.

John C. Hemment.

HINTS ON MOUNTANTS AND MOUNTING.

Mix up ordinary laundry starch—"Kingsford" is what I use—with sufficient *cold* water to make it the evenness of cream and until smooth. Pour this mixture into boiling water, stir briskly, and continue the boiling until the whole becomes clear; allow it to cool. Before use, strain through ordinary muslin (by placing it in the center of a square piece, gathering up the corners, and twisting together until the pressure forces the starch through the meshes of the cloth.) In cold weather, this will keep two or three days, and is better on the second day than on the first; in warm weather it will not keep (unless on ice) beyond a day; but it is so little trouble to make, that this is really a matter of small consequence. One advantage of the use of starch paste is, that it permits of soaking the print off the mount more readily than some others.

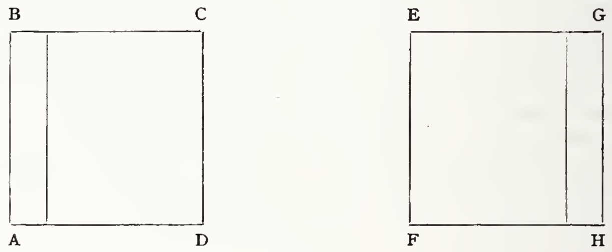
By adding four or five sheets of French gelatine to the boiling water before adding the starch, a paste is made that will hold nicely on cloth; on paper it will hold forever; the edges of the print almost never curl, or peel.

All paste should be strained as described, in order to make it work smoothly and free from lumps.

Prints can be mounted back to back. They should preferably be printed under a mat, so as to leave a border all round, and care must be taken that the grain of the paper runs in the same direction in each two prints that are to be backed together. In full sheets, 18x22, the grain always runs the "22" way, the stretch being across the grain. In smaller pieces, already cut, the grain can be distinguished by practised eyes, or by allowing the print to curl, which it will do *across the grain* of the paper.

Having selected the pairs of prints that are to be backed together, they are wetted in a dish of water, and a piece of glass having been laid on a convenient table, a piece of moistened white newspaper is first laid on, to prevent the prints sticking to the glass. Upon this the prints are laid, face downwards, and the superfluous water allowed to drain off. The back of the top print having been thoroughly pasted, it is carefully lifted, turned over, and laid down on the next one, so that the two backs come together. With a soft sponge the two prints are rubbed into closer contact, removing bubbles, and then laid between dry blotters, under a weight. After twelve hours, the blotters should be changed, and these can be replaced after another twelve hours by white printing paper. It takes at

least two days for prints mounted in this way to get thoroughly "bone-dry." They can then be trimmed, and if a greater margin is left at one end, this can be used to bind in book form. If this is intended from the start, allowance should be made for the binding on opposite sides of the two prints making up the pair, A B, and G H, coming together on the binding edge, while C D, and E F, form the free edge. Prints thus mounted cannot be burnished, but the paper retains its gloss if carefully dried.



In mounting prints back to back with muslin between, the same routine is followed; the muslin, cut into pieces a trifle larger each way than the prints, is put into the dish of water along with them, to become wet; and as the prints are piled up on the glass, as before described, a piece of the muslin is inserted between each pair of prints. The back of the top print having been pasted with the gelatine-and-starch paste, the print is laid one side for a moment, while the paste is applied to the muslin; the print is then laid, pasted side down, on the muslin, and rubbed into contact with a sponge. Print and muslin (now adhering), are then lifted off and laid one side; the muslin pasted again, the back of the print lying uppermost on the pile pasted; this print lifted off and adjusted on the muslin, and rubbed down with sponge, then placed between blotters as before. By leaving the muslin projecting on one edge, that forms a hinge for binding. The time required for drying is somewhat longer than before; if not dried slowly the prints will curl, and refuse to lie flat.

The muslin used is known as "India lawn." Prints thus mounted can be burnished.

Frank Irving.

PHOTOGRAPHIC BOOKS.

It is getting to be true that of making many photographic books there is no end. Five years ago, beyond which the writers' experience does not reach, it was not so. A request sent to a prominent dealer for a list of the best ten books for a beginner, met with no response. But since that time, by perseverance, trusting to advertisements, buying at random, a photographic library has been collected, and a few words in regard to photographic books may be of interest to amateurs.

The collection began with a pamphlet, "The Amateur Photographer," sent to me, with manuscript notes, by a well-known canoeist and amateur photographer, who has since been one of our European consuls. This, interleaved and supplemented with blank pages, became the most valuable of the collection. It contains, on pages opposite the various subjects, references to the rest of the books, formulæ, a collection of recipes and hints, a list of magazine articles worthy to be re-read and consulted, a list of periodicals, and a list of about two hundred and fifty photographic books. This first volume was followed by several books for beginners, two or three on photographic chemistry, some on the history and wonders of photography, two dictionaries, an indispensable hand book of apparatus, four magazines (one English), five annuals, including many back volumes, and various others.

To one accustomed to the use of a library the value of such a collection is evident. Difficulties are solved by it, questions answered, and intelligence gained in all directions. The best advice that can be given to an amateur who wishes to reach excellence, is to buy books. If he can consult an intelligent friend before buying he may be saved not a little useless expense. The only apology for a new book on any subject is that it gives something new, or that it gives what is already known in a better way. Some of these books on my shelves are mere compilations made without thorough knowledge, and without skill. Others are written by good teachers, who give clear and explicit directions, telling just what to do, and how to do it; and others still by those who also give the reason why.

The amateur needs, at first, directions merely, that he may learn to do; but the perplexities that are sure to arise can only be cleared away by learning the reason why. The first he can learn best and most rapidly from some skillful friend; the last also—if the friend knows. But, as such a friend is rare, most amateurs will need books, and he is fortunate who finds the

best. At first many new terms will be met with, and a photographic dictionary will be very useful. The one last published is good. But there is needed an *exhaustive cyclopedia of photogràphy.* Such a book, edited by a competent man, assisted by those thoroughly versed in the science and in the practice of photography, would be invaluable to everyone who uses a camera. It should be a book speaking with authority, one to be consulted in all difficulties, able to answer all questions, from the composition and action of the silver salt to the construction of the smallest piece of apparatus. What publisher will undertake the preparation of such a book? Shall it be English or American?

After the introductory books, the amateur, if he is a student, will want those which treat also of the science of photography. Three or four writers may be found who have made attractive and reliable books of this kind. Some on special subjects should be had, as on silver printing, and on the lantern. Much that is written on art is, to say the least, without value. It often misleads. A picture cannot be made by rule. Only he who studies nature until he has a sure eye for its beauty, will know (with a little experience) when he has found that which will make a picture. But books on this subject, even poor ones, may be of use if they stimulate thought, and help to avoid mistakes.

The advice to a beginner then may be, buy books, but buy slowly at first. A small book, such as "Photography for Amateurs" (written by T. C. Hepworth), should be read and re-read many times before any other is looked into. The style of this book is simple and attractive, and the directions so given that they may be easily carried out. Every time it is read, with new experience, something new will attract the attention. When this has become familiar, another English book, "An Introduction to the Science and Practice of Photography," by Chapman Jones, may well follow. This has been the favorite book of the writer, and it can be commended without reserve. The author is an adept in the subject, and knows how to impart knowledge . If an American book may be mentioned, "The Photographic Instructor" (issued by the publishers of this Annual) suggests itself. This is a good book, and has the advantage of being written, mostly, by an instructor for his pupils. The picture of the Chautauqua Professor at work, would alone give confidence in the book. The amateur will soon begin to feel the need of some periodical; and, perhaps, none will be more acceptable than the weekly

Photographic Times, with its instructive pictures. If an English visitor is desired, "Photography," a penny weekly, (Chapman Jones is one of the contributors) will be found satisfactory. The price of the ANNUALS is so small that several should be purchased each year. With what has already been mentioned the amateur may feel himself well equipped. But if he is progressive the need of other books will be felt, and they may be purchased more rapidly, but not more rapidly than they can be used. It is from the proper use of a library, and not from the library itself, that benefit is received. The amateur may read without becoming intelligent, or he may read, and think, and by practice become expert.

C. M. Dodd.

A FLASH LIGHT STUDIO.

THE manner of photographing by magnesium flash-light heretofore practiced by amateurs has proved to be of little practical value in professional studios, partly on account of inconveniences arising from the enormous volumes of smoke and from insufficient illumination of the subject. It has been my purpose by simple means to do away with all that, to produce more artistic pictures with a reduced amount of material, and a portable and modifiable light-source. The first and most important problems to be solved are: To avoid smoke arising from the burning magnesium, and to construct an apparatus with special regard to simplicity and portability, perfect and artistic illumination of the subject, and a correct combination of objective, emulsion plate, and developer.

Smoke can be dispelled from the operating-room by more or less complicated mechanical appliances, or be diminished by reducing the quantity of magnesium burned to such a minimum, that even after repeated exposures it ceases to be inconvenient. The latter is certainly the most preferable method, provided the light generated is powerful enough for the exposure. It is the most simple so far as the construction of the apparatus goes, and the most profitable because of the small quantity of magnesium consumed.

In the constructing of a lamp it should be remembered that a magnesium flame is impermeable, or, the light generated on the outside of a flame of burning magnesium particles does not allow the light of the inner light-cone to pass through; the illuminative power of the flame depends therefore on the

extent of its outer plane. It should further be considered that magnesium shows distinctly two different kinds of burning. When insufficiently heated it will not burn brightly, but merely glows without the emission of much light; a strong actinic flame will result after subjecting the magnesium to a long continued and strong heat.

To promote perfect combustion as far as possible and produce a powerful light, magnesium in powder should be distributed over a large surface of a flame of a high degree of heat. Furthermore the magnesium must be blown into the flame so as to pass through its longest extent.

Of all burners generating the highest degrees of heat, and in proportion with their simple construction the Berzelius (alcohol) and the Bunsen (gas) burners stand foremost. By regulating the supply of atmospheric air in such a manner, that at the moment when magnesium powder is blown into the flame, and with the aid of gas or alcoholic vapors mixed with air, an immense heat is generated and the combustion of the magnesium is perfect.

By introducing the powder in the direction of the axis of the flame, and on the spot where air and combustible gases mix, so that every particle of it is surrounded by combustible matter, a flame of the highest actinic power is generated. But when magnesium powder is blown across, or obliquely through the flame, or when it is mixed with bodies liberating oxygen and ignited by means of a fuse, on account of the low degree of heat of the flame, the actinic force of light is very much reduced in the first place and in the second there is much danger of spontaneous explosion. With these methods ridiculously large amounts of magnesium are consumed or wasted and enormous masses of smoke and noxious gases are produced. A simultaneous ignition of several doses of these mixed powders, arranged at different places to obtain desired effects, is quite impossible.

With the above described method, and a modified Bunsen or Berzelius burner, a number of lamps will furnish light at the same time and with a consumption of from two to three centigrams of magnesium for each lamp. With a Bunsen burner the height of these flames reaches from 90—130 c.m. with an average width of from 15—25 c.m., and with a Berzelius burner the dimensions are respectively from 60—90 c.m. and 35 c.m. The smoke from these small amounts of magnesium is but slightly perceptible.

To produce soft and characteristic illumination of the subject, a division of the light source into single flames of known power becomes a necessity. To illuminate with one lamp is always objectionable, unless it is done with intention to produce peculiar effects. With a number of simultaneous flashes distributed over the operating-room every desirable effect may be produced. With pneumatic connection of the several lamps by one pressure, two to three, even twenty, flashes of light may be had at the same time and within a small fraction of a second.

With this enormously intense light it is advisable not to place the lamps too near to the subject.

Next to the selection of an objective of strong luminous power, a suitable emulsion plate and corresponding developer is important. The action of magnesium light upon the plate is quite different from that of daylight and depends not solely upon its general force, but also upon the chemical action of those light rays not visible to the eye. Some plates highly sensitive for daylight are but little affected by the magnesium flame, and in some cases are perfectly useless, while with others there is no perceptible difference. The largest number of failures occurring with magnesium light may be explained by this fact. It appears incomprehensible to many professional photographers not well acquainted with the proprieties of the chemicals used, why well tried and otherwise reliable plates should cease at once to give wonted results. We advise them to test first the efficacy of the plate.

The closing of eyes in portraits taken by magnesium flash-light, so frequently complained of, is not necessarily caused by the subject closing the eye at the moment when the flash occurs and the picture is taken. When the quantity of magnesium powder (it is in my lamps from two to three centigrams) is in proper proportion with the flame of the burner, and a short but distinct pressure upon the bulb the flash takes but one-tenth or one-fifth of a second, and has passed away before the subject has become conscious of it. But every human being closes the eyes in regular intervals, or winks, and just as we often see in instantaneous pictures taken by daylight, almost impossible appearing positions of the extremities of a person, it may occur that a person is photographed when winking. The proportion of winking pictures is, however, not greater than from two to three in a hundred.

Over-exposed lights, glassy shadows or bronzed faces are mainly caused by the source of light being too near to the

subject, or the developer being of too low temperature. A feeble light or the lamps hanging too low will destory natural expression of the face, the whites of the eye are enlarged and cause an expression of fright or expectancy.

Abrupt shadows, not necessarily a fault in photographic portrait, are, if destructive of general harmony, easily retouched with the pencil.

I will now describe briefly the more essential parts of my establishment and my method of working. The three different lamps used in my studio and elsewhere are illustrated by the following cuts:

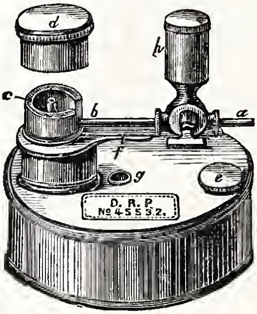


Fig. 1.

Fig. 1 shows the transportable alcohol lamp by which the magnesium powder is blown into the interior of an annular alcohol flame.

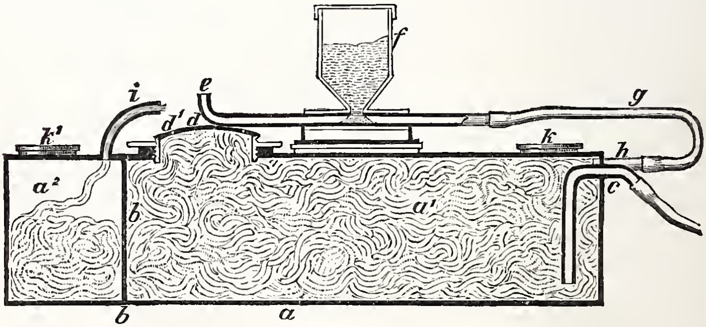


Fig. 2.

Fig. 2 is a lamp of new construction. The current of air caused by pressing upon the pneumatic bulb causes the flame to surround the magnesium powder. It forces air through a

chamber containing sponges saturated with a mixture of alcohol and benzine. Passing through the current takes up a considerable amount of their vapors, which on emerging from the tube are ignited. A part of the air takes up magnesium powder and carries it into the centre of the flame. When pressure ceases the light is extinguished. There being no free liquid in the lamp it is easily transportable and free from any danger. Material is consumed only at the moment of light generation, and as one filling of the lamp is enough for 300 flashes the method is very economical.

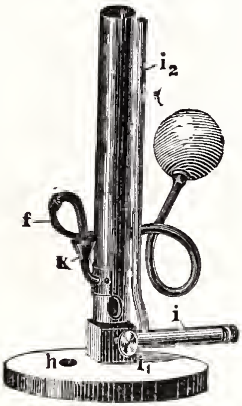


FIG. 3.

Fig. 3 shows a Bunsen burner with pneumatic blower. My studio is furnished with several of them. The transportable lamps are fastened to stands; those used in my studio are placed at a distance of 4½ m. from the floor, and attached to iron rails on the ceiling. Light radiates from them in a downward direction at an angle of 45 deg. They hang at a distance of 3½ m. from the subject, and the lamp giving the main light at a distance of 4 m. For cartes de visite and cabinets of single persons or groups of 2 and 3 I employ three lamps; for groups of 10 or 12 from five to seven, and for larger groups from eight to ten flames are quite sufficient.

Diffusing the light with tissue paper is not necessary unless the distance between sitter and flame is considerably decreased.

I use mainly the Voigtlander Rapid Euryscope with smallest stop. The Steinheil Group Antiplanat is equally good.

Fig. 4 explains the proper position of the lamps relative to the subject. It is impossible to give particular instruction for every individual case, but intelligently made experiments will show how to illuminate the subject to suit special demands.

My plates are Schleussner's, and, preliminary to developing, I bathe them for from a half to one minute in a solution of 1 gram hyposulphite of soda in 1000 c.m. of water, and develop with two-thirds of old and one-third of freshly pre-

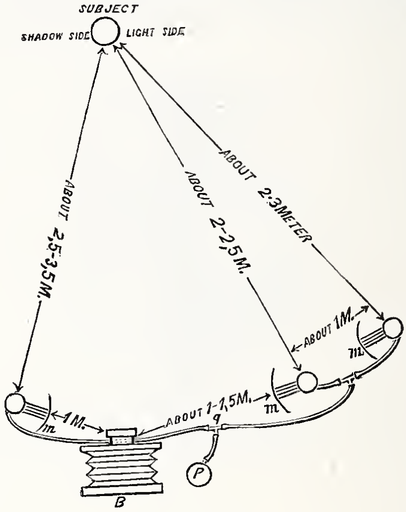


Fig. 4.

pared ferrous oxalate, with the addition of 1 drop of a 10 per cent. solution of potassium bromide and 1 drop of the above hypo solution. The combination of old and fresh ferrous oxalate with the preliminary bath and in conjunction with the employment of a constant light source of known power, the method has proved its uniform excellence.

The temperature of the developer should not be below 13 or 15 deg. C. With slight under-exposures the developer might be warmed to 30 deg. C., when harshness will be avoided and general harmony established.

After experimenting for a long time with all possible variaties of hydrochinon and eiknonogen developer, I have gladly returned to the ferrous oxalate, for equally and uniformly good results I have not had with either of the others.

Magnesium flash light is used in my establishment for all kinds of work; for enlargements and for the making of diapositives, for reproductions, transfers, and the printing upon chloride or bromide of silver paper.

We have, in fact, become entirely independent of sunlight.

C. C. Shirm.

OUT OF FOCUS.

"Why is it," inquired an amateur photographer of no little experience, "that we have so many failures with so many first-class outfits?"

The question was unanswered, but it set the writer to thinking along the way of his own observation and experience as well as the common and pardonable faults of many amateur photographers. Principal among these reasons will be found that disagreeable one of "out of focus." Two or three causes may exist for this. The first and most common, doubtless, is a want of agreement between the focal plane of the ground-glass and the plate-holder. Focus as sharply as one may, yet the negative will not appear as sharp as the image on the ground glass. This fault sometimes occurred in the old style of lenses from what was called want of agreement between the visual and actinic rays, but which is not found in the present form of photographic lenses. The great trouble is that a camera made by one firm and a plate-holder by another seldom agree, and the query arises, will there ever be such a thing as standard plate-holders of a given size in this regard? The fault also may exist in the holder itself, one that allows the plate to move to and fro in the plate-holder must be remedied by placing a few folds of paper back of the glass, or what is better, insert a light spring that presses the glass to its place. In case of the other defect the remedy easily suggests itself.

The second reason, and one not so easily discovered, is in that of the lens itself. The image we will suppose is sharply focused say in the center of the ground glass and promises well; the small stop is inserted, but the negative does not appear what the focus promised. Again the operator attempts to copy a negative into a lantern slide, the same process is gone through with as above, but the picture is by no means a sharp one, though the negative be ever so good. This is also true in case the attempt is made to copy new objects, as printed matter or illustrations. The cause of this difficulty

will be readily seen if on focusing the lens with open stop by aid of a magnifying glass, and then inserting the smaller diaphragms. The image if again examined will have been found to have lost in sharpness. Some lenses, particularly view lenses, or single lenses, improve in sharpness when stopped down, but with the one under consideration it loses.

The remedy in case of lantern slides and copying of pictures, is to always focus with the stop in that one intends to use. In many cases this is somewhat of a difficult operation, but there seems to be no remedy for the varying distance of copies and pictures but this one. As to landscape work, this difficulty can sometimes be met by changing the point of focus from the center towards the side of the ground glass, bearing in mind that the object there focused must be nearly on a plane with the one that is central in the field of view, and is desired to have especially sharpness. Now insert the small stop and in some cases the central objects will appear as they should, while the whole field has gained in beauty and sharpness. But where the lens will not admit of the procedure the only resort is to always focus with the stop in the lens that is desired for the picture in hand.

The third cause of pictures being out of focus is a defective method of exposure. In all time exposure, one would hardly be aware of how slight a jar or tremble will produce this. Examine the picture on the ground glass with a magnifier and see how sensitive the tripod is to the extra jar so often and easily communicated to it. This can also be seen in the use of many forms of time shutters when the jar of the shutter is at once communicated to the instrument, a fault more common than is supposed, but one that is worth a little examination into and some experimenting to overcome. Over two hundred negatives are before me as I write that were taken with good instruments by the same operator, and out of the entire number hardly three can be called first-class, or what they might have been had some of these difficulties been in mind and guarded against (happily the writer did not make the negatives referred to). Many negatives betray the too common fault of overtaxing a lens, of striving after the impossible, of attempting instantaneous work without adequate light, focus or plates; while others, of the attempt with inferior lenses to do the work of the best. A poor lens carefully used will often give most excellent work, while the best without this will yield only disappointment instead of satisfaction and pleasure.

Rev. Dwight W. Smith.

THE ABUSE OF THE HAND CAMERA.

In common, doubtless with many others, I have been led to deeply deplore the rage for employing hand, or (so called) Detective Cameras, which has swept over the country as a flood during the past year. Every would-be photographer has possessed himself of one of the fascinating little boxes, in some one of their many forms, and older and more experienced devotees of the art, (who ought to know better), have in too many instances sacrificed *picture making* to the facilities for procuring a rapid succession of "snap shots," afforded by their use. The consequence is, that whilst there has been a vast consumption of plates and films, comprising many thousands more of exposures than ever were made before, in the same space of time, the past season has produced fewer *pictures* than usual. At least this has been my experience, and I have been in a position to see many thousands of negatives, not one in a hundred of which was worth the cost of the material. "You press the button and we do the rest," has become an adage familiar to all, but its practical application has been so abused by every tyro, who had wit sufficient to "press the button," that lovers of true photography have grown tired alike of the saying and its results.

Do not misunderstand my meaning, however. I make no sweeping onslaught upon the hand cameras, or desire to read them utterly "out of meeting." Far from it. I fully recognize their extreme usefulness at times, and that they fill a place which no other form could possibly do. For street scenes, odd characters to be met in our daily walks, and for recording many little glimpses of travel, they are simply indispensable, and enable the possessor to pick up *bits*, unattainable by any other means. It is the *abuse*, not the *use*, of the hand camera that is to be deprecated.

To make an artistic, harmonious, satisfying landscape photograph, thought and study are requisite. The point of view must be well chosen; often the moving of the camera but a foot or two will alter the whole character of the view. The lighting is all important; due proportions of light and shade must be maintained, some main point must be brought out prominently, the interest must not be too much diffused, and a suitable foreground is absolutely necessary. All these requisites cannot be united in a "snap shot," save through the rarest and happiest accident. The picture must be composed upon the ground glass screen and the focus of the lens accurately adjusted,

with the camera resting securely upon a stout and solid tripod. Only under such conditions can a really satisfactory landscape picture be secured, and one such is more satisfying to the artistic eye than a house full of the ordinary "push the button" photographs which have been made *ad libitum* during the past year or two.

But it is quite apparent to any observant looker on, in a position to see a number of workers, as well as their work, that a healthy reaction has already set in. Multitudes, after accumulating a heterogeneous mass of negatives, hurriedly made without thought or study, with the handy little "snapper up of unconsidered trifles," have found their appetites satiated with such unsolid diet, and turn with fresh zeal to their neglected cameras of other styles. What matters the extra weight of glass plates or cut films with their carriers, if the resulting negative be a thing of beauty? Such at least has been my own experience. For some two or three years past my larger cameras have been consigned to the darkness of the lumber room; and upon the few occasions wherein I could find leisure to do any out door photography, a small hand camera has been almost my only companion. I have used it during many journeys, both on land and sea, and with its magic aid have secured numerous souvenirs of travel that are invaluable, and which recall many an otherwise forgotten scene or event. And herein, (as I take it,) lies the true value of the hand camera; a value which could not be replaced by one of any other form.

Desiring, the past summer (during an all too brief holiday), to secure some views which might please as *pictures*, rather than from associations connected with their taking, I discarded the hand camera utterly, and carried with me a long-disused, but still perfect box of former days. It was one of Flammang's Revolving Backs, made in the usual perfect workmanship of The American Optical Co. Rather heavy? Well, a little so; but with sixteen glass plates, carried in eight "Daisy" double holders, a battery of lenses and a tripod, my strength or endurance were not severely taxed in several lengthy tramps over a mountainous country; though the size ($5\frac{1}{2}$x7) was not an unduly small one. This form of camera is the most convenient in use of any with which I am acquainted; the facility with which the view can be changed from horizontal to vertical, or *vice versa*, being unequalled. With this box, a Bausch & Lomb Universal Lens of 9-inches focus, fitted with their latest shutter with automatic movements varying from three seconds

Negative by Mrs. J. C. Kendall.

TRAILING ARBUTUS.

Kurtz Process.

to the $\frac{1}{100}$th of a second, and quick plates, I secured some five dozen views, any one of which, *as a picture*, is vastly more satisfactory than all of the negatives I have ever made with a hand camera.

Each form, however, has its proper and legitimate field of work, if confined thereto. The trouble has been with so many endeavoring to use the hand camera in work for which it was totally unfitted; and herein lies its *abuse*. It is such a fascinating instrument, so easy to use, that little wonder exists, why it has been called upon for so many purposes for which it was not intended, and is quite unsuitable. And so it has come to pass that its *use* has degenerated into *abuse*, and the object of this short communication is to call the earnest attention of all lovers of photography who may have gone astray in this direction thereto. in hopes that they will retrace their steps ere it be too late.

In conclusion; let every amateur, if possible, become the happy owner of a good, well made camera, lens and tripod, for serious work; and in addition thereto, of an equally good "hand camera." He will then be well provided for all emergencies, and will soon learn to *use* and not *abuse* the latter convenient little instrument.

W. H. Walmsley.

ON THE USE OF A CENTRAL SEPTUM IN CAMERAS.

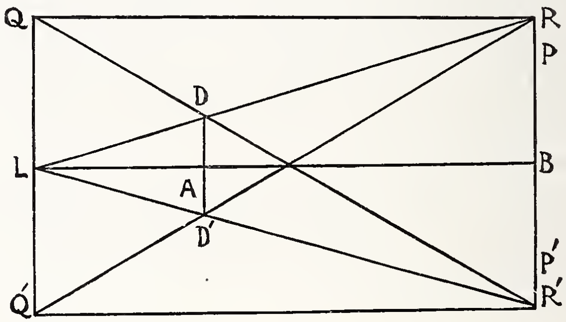
In the ordinary construction of a camera, whether it be made with a bellows or a simple box, there is a manifest source of fog which has to be guarded against; namely, the reflection of light over the plate from the inner surface of the camera. This is particularly liable to occur when the lens is capable of covering a plate considerably larger than the one which the camera is meant to carry; for in this case a considerable part of the actual image formed by the lens falls on the top, bottom, and sides of the camera, and may be reflected thence to the plate.

Of course this difficulty is usually guarded against by having the inside of the box blackened, and if possible with a dead or quite unreflecting surface. But it may be more completely avoided by the use of a central septum or diaphragm.

It is not claimed that this is an original idea; it occurred to and was used by the writer some years ago, but may have been published a good while before that. But I do not remember

having seen the proper conditions for its construction carefully and accurately presented.

The idea consists essentially in having a septum or diaphragm placed transversely in the camera with an aperture in the centre such as to allow the light from the lens to fall on the plate, but to cut off any coming from the sides, bottom, or top of the box. This aperture should evidently be rectangular; but the points to be determined are where it shall be put and how large it shall be.



Let Q R R' Q' be our camera box, and let L represent the lens, P P', the plate; that the first condition should be fulfilled, that is, that the rays from the lens shall not be cut off from the plate, the top and bottom of the diaphragm aperture D D' must lie on or outside lines drawn from L to P and P'. But practically, as the lens really is not a mere point, and as light falling on the back surface of the box outside the plate is harmless, we had better give a margin for the rays coming from the edges of the lens or stop; so we will say that D D' must lie on the lines L R, L R'. This will ensure full illumination on the edges of the plate.

Secondly, that reflected light from the bottom and top of the box may not reach the plate, D D' must lie on or within the lines R Q', R' Q. The point where the lines R' Q and L R intersect, then, will give the greatest distance from the lens at which our diaphragm can be placed.

To determine the position of this intersection, we have

$$\frac{LB}{LA} = \frac{RR'}{DD'} \text{ and } \frac{LB}{AB} = \frac{LQ}{DD'}; \text{ hence } \frac{AB}{LA} = \frac{RR'}{LQ}$$

But R R′ is twice L Q; hence A B is twice L A; or the diaphragm must not be more than one third of the focal distance from the lens from it. Its dimensions, if it is placed at this point of intersection, should be one third of those of the cross section of the box.

If Q Q′ is less than R R′, of course the diaphragm should theoretically be somewhat nearer to the lens; but reflection from the parts of the camera near the lens is hardly worth allowing for.

A slight correction would also have to be made for the position of the stop of the lens, which would probably not be just in the line Q Q′. But this also is hardly worth troubling ourselves about.

This construction is specially recommended for detective cameras, in which the box is square, and in which no allowance would have to be made for a rising front. It may, however, be very easily applied to a bellows camera, the diaphragm being made of paste-board, and inserted at about the right place in one of the folds of the bellows. The principal point to be attended to is not to make its aperture too small, so that light will be cut off from the edges of the plate.

G. M. Searle.

EXPERIMENTS WITH THE MAGIC LANTERN.

It is desired in this article to give the readers of the Annual the result of some experiments made in the adaptation of the electric incandescent light to the magic lantern, and also to describe a very convenient stand or cabinet that greatly increases the convenience with which an exhibition can be given.

The writer's house being lighted by electricity exclusively, and no gas being conveniently at hand to aid in the production of the calcium light, it was decided to try the merits of an incandescent lamp as an illuminator for the lantern.

Accordingly a 50 c. p. lamp of the usual pattern was procured for the purpose, this being the largest that would conveniently go inside the lantern body.

Upon a base-board similar to the one supporting the calcium jet was attached what is known as a wall-socket, into which the lamp was screwed.

By a piece of good fortune this arrangement placed the lamp in the right position as to height, while the adjustment

back and forth could be made at will by sliding the base-board to and fro in the lantern body.

Connection was made with the house wires, and the current turned on.

The results at first were not very encouraging, but it was soon found that by placing the lamp so that the filament was presented, so to speak, nearly edgewise to the condensers it greatly increased the amount of light, but unfortunately threw a shadow of one-half of the filament on the screen. This shadow unfortunately cannot be eliminated without a fatal loss of light.

Two more improvements have been made, the one to employ a half-size Darlot objective in place of the quarter at first used, which change results in a surprising gain in light; and the other the substitution of a lamp of a few volts less than those usually used, in this case a 50 volt lamp in place of the usual 52 volt. By this means the filament is maintained at a brighter incandescence giving again an increase of light.

In short the result of the experiment shows that by placing the filament at right angles to, or end on to the condensers, and employing a lamp operated at somewhat more than its normal voltage, we obtain a light rivalling the best oil lamp in brilliancy and possessing at the same time a great deal of the whiteness that characterizes the calcium light, and which is so painfully lacking in oil-lamps.

In conclusion it may be remarked that it is not expected that an incandescent lamp of a rated candle power of 50 will be found adequate to the demands of a public exhibition, but the results in this case show that it will yield a light preferable to any oil-light, giving a remarkably white light, and being at the same time the most convenient light known.

In this connection it may be well to give a brief description of the paraphenalia used by the writer at his house in giving a private exhibition. With the apparatus as now arranged the lantern can be set up and a picture thrown on the screen in something less than a minute by actual timing. Of course everything is most conveniently arranged.

The screen is a smoothly plastered wall and is always ready. At the other end of the room stands a cabinet containing on the one side the lantern ready focused with lens attached, and on the other side a series of pigeon holes 3½ inches high, 4 inches deep and about 5 inches wide capable of holding about 800 slides.

In this manner everything is kept as nearly ready as possible, and if it is desired to show even but a few slides or to try a newly made batch, all that it is necessary to do is to open the doors on the opposite sides of the cabinet, which doors being hinged at the bottom drop down out of the way, place the lantern on the top of the cabinet, screw a plug attached to the lantern by a flexible cable into a wall socket near by and turn a switch, all being done in a moment and with scarcely any trouble.

S. L. Walkley.

COMPOSITION IN LANDSCAPE PHOTOGRAPHY.

Good composition is as essential to a pleasing picture as it is to good literary work. Everyone knows that fitting composition in writing means the careful choice of words suited to the temper of the work and their arrangement into easily flowing sentences. The principle of pictorial composition is the same.

It has no other aim than aid in the production of a pleasing picture. It may be defined as the selection, arrangement, and combination of natural objects in such a way as to give a pleasing presentation of forms and gradations; to tell plainly the story of the picture and to embody its sentiments.

Unity, harmony, and expression, are the three essentials in all good pictorial work, whether done with pencil, brush, or camera.

Where the worker with the camera can secure these in his views his pictures will have something other than a merely topographical value, they will be pictorially pleasing.

Hence the landscape photographer must exercise great care in the choice of a subject, must often wait for a favorable effect of light, or for a lucky arrangement of clouds; must in short, be constantly on the watch for fine Natural Compositions, ready to appreciate them at once, and to seize upon what is necessary, and leave out what is *impertinent* and offensive to the compositions.

For this he needs even more than the figure or still-life photographer to know the elements of scientific composition.

The principal object, which artists often call the *motif* of a composition, had better be accompanied by something which will form a contrast to it.

And lastly that the contrast may not be too violent, there had better be intermediate objects which may be classed accessories.

To recapitulate in the form of practical rules, it is well, so far as possible, to choose for your principal object whatever is the best and most characteristic of its kind, to clear it of whatever is unsuitable, to see that its component parts are properly related, and to bring it out against a background properly adapted to give it the appearance of a concrete fact, and not of a scientific diagram, it is important to add that all of these rules must be observed in every part of a picture, not only should there be contrast in itself, not only should its parts hang together (*as artists say*), but the entire picture, *motif*, contrasting object, background and accessories, if there be any should hang together and the composition should have a unity as a whole.

Example No. 1.

The group of trees in the centre of Example No. 1 constitutes the principal object which is contrasted as to color, by the bright mass of sky behind, as to the uprightness and strength by the winding road, and in a lesser degree by the leaning tree near the cottage.

It is brought vigorously out against the sky, and though varied and broken, presents a mass sufficiently united to be impressive, thus the picture satisfies our requirements in every way as to unity, variety, contrast and harmony.

The example already given has been introduced for the purpose of showing what composition is, and not for the purpose of showing how a picture should be composed, but so as to secure the great essentials of unity, contrast and harmony, they might be made to serve this more practical aim as well, but it is preferable to introduce new examples so as to give some idea of the multitude of ways in which a satisfactory result may be reached, and to avoid the appearance of giving receipts for making pictures.

Example No. 2.

But however many different compositions there may be, and however great the need of invention and watchfulness, there are not only the broad principles already alluded to, but also a certain number of typical schemes, to which all possible schmes of pictorial compositions are related.

All of these types of composition depend on the reduction of the irregular forms of nature to simple and regular, or as they are sometimes called geometrical forms.

Given an arrangement of triangles, and rectangles for instance which has a certain unity or a harmony of proportion, between its parts, and let these be a group of natural objects which

EXAMPLE No. 3.

come passably well into the forms and positions of these triangles and rectangles, it is plain that the natural arrangements too will have enough of unity and harmony for a pleasant composition.

G. J. Stengel.

AN INVITING FIELD FOR CHEMICAL RESEARCH.

IT has been asserted that the tone of the resulting photograph is established when the cap is replaced on the lens after exposure of the plate. This is to a certain extent true, though development of the negative may have important relations to the tone-character of the picture. And every photographer, particularly every amateur who does anything more than "press the button," has been annoyed at times, by the perversity of his prints in the toning bath, and disappointed when they have been fixed and washed, to find them resemble the young lady's hair, which was said to be "Canandaigua color," —a little beyond Auburn. But why is toning necessary? In all the advancement and improvement in photographic

methods, the old and expensive and troublesome toning bath still remains. Bromide papers cannot displace the silver print, and it seems to me that there is a most inviting field for chemical investigation and research, to produce a sensitized paper that will only need fixing to secure the tone that has been established for it by the exposure and development of the negative. With all the numerous chemicals, and the myriads of possible combinations, it would seem as if some addition to the silver bath for sensitizing the albumen paper could be found, which would leave the resulting print of a dark tone after it leaves the fixing bath. Gold is certainly not necessary for the permanency of the photograph, for bromide pictures are at least equally permanent, and no gold is used in their composition, and it has been possible to make photographs of good tone without the aid of gold, or similar chlorides. I have not had opportunity to experiment in the direction indicated, but only point the way for others to pursue the work.

Marcus H. Rogers.

A NEGLECTED PHOTOGRAPHIC MATERIAL.

Put not your faith in wood, nor the things made of wood! The amateur who has dabbled in camera making; or who has perhaps worked out an idea in wooden drop shutters; or who has made for himself an extra lens board; or who has in other directions evolved the products of his fancy in wooden shape, to him this moral will have come home before this, in fogged and streaked negatives. And if he has fled for safety from amateurdom and his native woods to the professional mahogany and French polish, he has not escaped all his troubles, for even here he is directed to hide his camera carefully under the homely focusing cloth from the insiduous actinic ray. To overcome some of these latent frailties of wood, the writer proposes a liberal use of a neglected photo material, to wit: Felt. With this he hopes to supply a long-felt want. That the material is already appreciated is shown by its use in some cameras for the "plug" or lens-cap, and also as a lining at the joint between the roll-holder and the camera.

The material is easily and cheaply procurable, as it is used largely for table covers, throws, and the like, and should be chosen of a kind entirely felted, as soft and thick as possible, and not reinforced by any weft of thread as some of it is. A dark shade should be selected, there being no full black to be had commonly.

By far the weakest point of the regular view camera, as far as light-tightness is concerned, is the shifting front, when this consists of a sliding board. If any one should go to the trouble to take the average camera in hand, meaning by this a good camera, by sighting carefully against a strong light, he can usually see a streak of light passing clear through the joint between front and camera, some of which will surely find its way inside the camera. To avoid this fruitful cause of fog, I have known of several photographers who either calked a light-tight joint inside the camera, locking the front permanently and thus sacrificing a valuable adjunct, or else they have crudely tacked in black cloth to produce a movable, safe joint. This joint, however, can be made neatly and even elegantly snug by two paddings of felt, as indicated in Fig. 1, where the upper one of these paddings is shown at C.

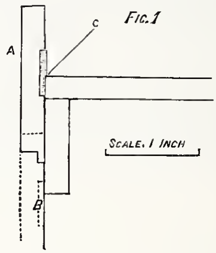


FIG. 1

The figure is drawn to scale from a 5x8 camera. At A a section of the shifting front is seen ending with the rabbet for the lens board; C is the angle formed with the front and the camera body, and B is the opening in the latter. The front is raised to the limit of its upward travel, three-quarters of an inch. In beginning work, first of all, the front A is moved as far as it can be moved in one direction, say upward, as shown. A pencil mark is made at C and the thumb screw is removed allowing the front to be pushed up a quarter of an inch more, for lap, when a line is drawn in the corner C to mark the lower edge of the groove. The screw is now put back, for the sake of accuracy, and the front is pushed down as far as it will go (five-eighth of an inch, see dotted lines), and a mark made at the corner B. The screw is again removed and the front pushed down a quarter of an inch, for lap, and a line is drawn across it in the corner B to mark the upper limit of the groove to be cut for the felt. To avoid confusion the lower end of the front has not been mentioned, but it can be marked at the same time

with the other. The front being removed entirely the space between the pencil lines, as at C is to be formed into a depression to receive the felt, and it should naturally be a little less in depth than the thickness of the felt. The grooving can be done with a chisel, a plow, or in the writer's case, by means of a small foot power circular saw arranged as a "wabbler"; a device well-known to wood-workers. The felt can be cut to size with a shoe knife such as is used in print trimming, bearing well down on the straight-edge to prevent shifting. A little glue is applied to the bottom of the grooves, the felt is adjusted in them; the front is then turned, felt side down, on a flat surface and a small weight put on while the glue dries. If the depth of the groove has been carefully adjusted, the front, when put back, will be an easy sliding fit and perfectly light-tight.

The next thing that requires attention is the lens board. No matter what precautions have been taken by the maker to prevent warping and shrinking and to obtain security by breaking joints, a misfit soon results with its sheen of light within the camera. The systems of rabbeting vary by which the board is fitted to the camera, but one example will serve to illustrate the use of felt here.

Fig. 2

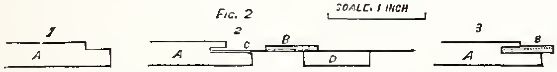


Fig. 2 shows the edge of a lens-board, face down. The grooving can easily be done on an amateur's circular saw, and may extend inward three-sixteenths of an inch. Where the lens-board is plain edged without rabbet the work is simple indeed, even with a thickness of only three-sixteenths of an inch to work on. The felt strips are to be cut a little wider than the groove is deep, and can be trimmed after the felt is glued in. The gluing may seem fussy work, but with a little preparation is very simple. At D in the figure is shown a piece of paste-board or wood to serve as a rest for a sheet of tin-plate C; dimensions will suggest themselves. The lens-board A, with the groove previously smeared with liquid glue, is shown in part two, Fig. 2. It is best to place a weight on top for steadiness. The tin is pushed into the groove and the felt placed as at B. Now, with the shoe-knife, or even a table-knife, the felt is compressed and pushed into the groove little by little for the whole length of the strip; the tin can now be pulled out without disturbing the felt and the other edges are

ready to be treated in turn. In part three, Fig. 2, will be seen the finished job.

With the shifting front and the lens-board thus equipped, the focusing cloth can be kept away from this end of the camera, avoiding the risk of its flapping in front of the lens in windy weather.

The writer has had in contemplation the padding of the plate-holder end likewise, and thus to relegate the focusing cloth to the menial office of gossamer and duster to the camera. As a focusing cloth it is not at all necessary if some form of focusing hood is provided, attached permanently to the ground glass; a method that has been proposed and reported from time to time and which is far superior to a cloth, since it encloses the ground glass entirely and is wind proof. To enlarge further on this subject would be wandering from the text; suffice it to say, that such a hood made of canton flannel, with collapsible wire frame at the eye end carrying hooks like the "riding temples" of spectacles, and also having affixed the lenses and frame of a cheap pair of spectacles has proved a most satisfactory arrangement in practice. The permanent magnifiers, especially, have been most useful in focusing in a dull light and with lenses of small aperture. But this still leaves the joint of the plate-holder with the camera open to suspicion, which might be made safe with an inner edging of felt, still leaving the slits in the plate holders unprotected. These slits are nominally protected against the entering light by the very ingenious light-traps, but these, as far as my experience goes being made of inflexible wood bearing against wood when the slide is entirely out, or bearing against the more or less uneven surface of the slide while it is being drawn out or being inserted, are not a sufficient protection against light in these days of ultra sensitive plates. And plates lost in this way are perhaps the most exasperating of all failures. The focusing cloth is a partial but clumsy protection, but whether or not, felt can be called in here to give absolute security is a problem that looks formidable; at any rate is without solution at this time and place.

There are other uses for felt, as when it is employed to line the body of the drop-shutter of the ordinary type. Here again it makes an absolutely light-tight joint, whether the shutter is set or discharged; working only with a slight friction which the usual rubber bands effectually overcome. A pad of two or three thicknesses interposed between the bar of the

slide and the body of the shutter makes a good bumper to lessen the shock.

In fact, when once the attention is drawn to this useful material, it will come to mind in many emergencies, and many such cases might be cited from experience except that they would seem only personal and trivial.

Speaking of drop-shutters, the felt is applied whole and the openings can be cut out after the glue is dry, using a sharp penknife after the manner of a fret saw. A tolerably clean-cut circle results, which can be further smoothed by singeing the edges with a hot rod of iron wherever required.

Ottomar Jarecki.

HASTEN SLOWLY!

The way we look at a subject is so much influenced by previous experience and education that, until one is pretty certain that his listener has had both, it is unwise to become over-enthusiastic. Photography is now the recreation of so many, that thousands of its amateur practitioners care nothing about doing better work, or in fact accomplishing anything further than to make instantaneous pictures of every variety of subject with the small hand cameras in such general use. It is true that from time to time we discover amongst the prints made from negatives taken at random by the dozen combinations of rare beauty, but they are seldom other than accidents, not to be undervalued for themselves but proving no intelligent will controlling an unintelligent but fairly faithful servant. Is not the facility with which all classes may make pictures to-day likely to reduce the numbers of the earnest students of the art, whose ambition it is to raise the standard of photographic work and master processes, not be a slave to them?

The reproductive processes are teaching all the world to see photographically and that word is by no means a synonym for artistically. There is no use in striving to be heard with a cry of "Halt!" But our eyes are being badly trained and a new generation is coming on apace influenced more by the science than the art of photography. Surely one is not wrong in claiming a needed marriage between science in methods and art in choice. Every painter of landscape knows how important a matter it is to select the right time of day as well as the right point of view, even the time of the year. The most enthusiastic realist confesses to this.

Does this spirit pervade sufficiently the ranks of amateur photographers? They have no time to learn and so make shots right and left to keep pictorial memoranda of home life or travel.

All this is well enough, but I wish these words of mine to fan the flame burning in the hearts of the faithful who do less and better, and whose desire it is to improve. What need there is for improvement a casual glance at the collection of almost any disciple of the photographic art will prove. Even our journals give us too much that is not of the best pictorially, and are unconsciously perhaps helping on the wrong cause. Portrait photography leaves still much to be desired when we compare its results with the best that the leaders in the department of portraiture have left us, or are in our day producing for us. Would it not be wise from time to time to offer examples, recognized as master-pieces, that by the study of their qualities which might be pointed out and explained in accompanying text, the many earnest readers of your ANNUAL would be stimulated to further search and study. It is really, in my mind, too easy now to take a photograph.

J. Wells Champney.

INDUSTRIAL PHOTOGRAPHY.

ONE of the permanent results of the immense development of photography which has followed the introduction of the gelatine dry plate is the establishment of what may be called industrial photography. In nearly every line of productive business it has been found desirable to illustrate either products or processes in a manner which shall be accurate and economical, and until the practice of photography became equal to this demand many things which should have thus been recorded were neglected. At the present time this branch of photography has grown to an extent which few people are aware of, and nearly every large manufacturing establishment has its dark room and photographic equipment, while numbers are provided with skylights and extensive printing rooms.

The outfit required for such work must of course vary greatly with the requirements, but it is surprising to see how small an expense need at first be incurred in order to give the matter a trial. Several cases within the writer's experience may serve to illustrate. In one machine shop, building tools which when finished were in excellent shape for exhibition, it had been the

custom to wait until the time for shipment had arrived, and then, at a cost of much time and labor of several machinists and laborers, the machine was placed in the back street. Meanwhile a professional photographer, whose establishment was about two miles away, was hastily summoned, and if he was not otherwise engaged gradually appeared upon the scene bearing two large boxes and a heavy tripod, and in fact carrying an entire wet plate outfit, bath, collodion, etc., except a dark tent, there being a closet which could be used for that purpose. Several exposures were always made and developed while impatient teamsters were waiting to haul the subject away, and the actual cost of those photographs when all the incidental expenses were included, was far in excess of their value.

One of the draughtsmen had become possessed of the amateur craze and had invested in a ten dollar 4x5 outfit, and one day, when an important piece of work was being hurried off and the distant professional failed to appear, he offered his services, with such satisfactory results, that before long a dry plate outfit of moderate cost but excellent capabilities was added to the drawing room equipment, and the blue printing and photographing became practically an adjunct to the drawing office with most gratifying results.

Now, although a single lens and a cheap camera may hardly be thought equal to the task of photographing fine machinery, yet it was surprising to find how satisfactory the first results were, and the final cost of a good equipment for the work was less than the value of the time and labor wasted by the old plan.

In many establishments the advantages gained by having all products photographed have proved sufficient to warrant the employment of a professional photographer, and work enough offers to keep him constantly employed. In one case, which may be taken as typical of numerous others, the photographer is given a commodious room with a good skylight and excellent facilities, and the general products of the manufactory, which are varied in character, are all photographed, classified and numbered, and sets of these photographs are distributed to customers and to the trade far and wide, while small blue prints, attached to cost sheets and estimating lists, enable the articles to be identified and described in a manner not otherwise practiceable. From the negatives, "process" illustrations are prepared, and the results have fully justified the wisdom of the course.

A well made photograph is an article of sufficient value to

demand preservation and examination, where even a handsome wood engraving would be thrown aside unless the observer possessed already an interest in the subject, and the means of producing effective photographs can now so readily be obtained that there is little reason for neglecting their use. If some of our enterprising dealers would prepare moderate cost outfits for industrial photography, with a good lens, solid camera and stand, great portability not being necessary, and issue also careful instructions as to the important points connected with indoor photography of moderate-sized objects: lighting, timing, point of view, etc.; this important branch of photography would receive an impetus second only to the sudden growth of interest which some ten years ago was witnessed in landscape photography.

Henry Harrison Suplee.

ON HYPOSULPHITE AS AN ACCELERATOR.

That hyposulphite of soda gives increased energy to the ferrous oxalate developer, is a well-known fact. The usual direction of adding a few drops of your fixing bath to your developer is too crude and off-hand to recommend itself. Again a given quantity of a 1,000 or 2,000 per cent. solution is mentioned. From a very considerable experience in its use I find the following formula the most convenient and practical:

Hyposulphite of soda	160 grains
Water	8 fluid ounce

Of this, to four ounces of developer (the usual bath for a 4x5 plate), you can add one dram (equal a teaspoonful), with absolute safety and telling efficiency. It causes no fog and fully trebles, if not more, the power of the developer.

Next as to its desirability. I have no hesitation in saying, if you can get along without it, do so. Use it only as a "*corps de reserve*" and when necessitated. If on usual time a plate is evidently in need, add it, and its efficiency will soon be seen. If however a plate is only somewhat or slightly behind time or what it should be, give it longer development without the addition. For plates having a mere shadow of exposure and known to be very greatly under-exposed, you can make up the bath primarily with it—and again it proves very serviceable when on developing successively plates in one and the same bath, the third or fourth one, as the case may be, "hangs fire," and will

Negative by C. N. Parker, Morristown, N. J.

THE LIFE CLASS

Stevens & Morris, Engravers, New York.

not come up. Its addition effects the object at once. From its use in hundreds of cases I deduce that the results are finer in its *non-use* than with it, and yet I would not willingly be without it, and regard it as a most valuable accessory in ferrous-oxalate development.

J. J. Higgins, A. M., M. D.

PYRO VS. EIKONOGEN.

It has long been admitted that it is hard work to teach an old dog new tricks. When I apply this to myself, so far as pyro is concerned in the development of plates, I fully recognize its truth. Nevertheless, I feel called upon to admit that for short exposures there can be but little doubt that eikonogen will give equally good results as compared with pyro with shorter exposure and a reduction of the time of development, fully one-half if not two-thirds. I am not prepared to say that I like eikonogen quite as well for plates that have been fully timed as I do pyro; perhaps it may be due to my want of experience in handling it, for having used pyro ever since it was first suggested for the gelatine plate, I have become so familiar with it that I can handle it with a degree of certainty that does not seem to apply, in my hands, to eikonogen. Previously to adopting the formula which I give below, I tried quite a number of published formulæ for the use of eikonogen, but none seemed to work well, the great difference being that as compared with the others this contains a larger proportion of sulphite of soda. This formula, although it is made up in one solution, to which many have a great objection, I do not find any trouble whatever in handling, always providing that it is immediately placed in small bottles filled to the cork. Under these conditions it has kept in my hands for fully two months without any deterioration so far as I have been able to discover. If a bottle is but partially full there is a change, it will change color and lose in energy. The negatives are quick printers, and I think some of the troubles that have arisen from the use of eikonogen have been due more to the printing in direct sunlight, where the negative being of a different shade of color from that produced by pyro, should have been printed in a frame covered with a piece of tissue paper. Pyro developed negatives as produced by the average amateur are, as a rule, where not over-exposed, quite strong, very much stronger than those produced by eikonogen. As a

rule, most of the amateurs have their printing done by some professional photographer; such have not the habit of using paper highly silvered, this being required for a weaker negative. The result is that the prints are flat, and the plate is blamed, when really the fault lies at the door of the printer.

The formula above referred to was given to me by Dr. Ehrmann, and is as follows: Heat 32 ounces of water to the boiling point, remove it from the fire and dissolve in it 4 ounces of crystallised, or 2 ounces of granulated sulphite of soda; after that 1 ounce of eikonogen, then 1 ounce of carbonate of potash; this dissolves at once; see that the solution is well stirred up with a glass rod and place in small bottles filled to the cork and tightly closed. I would suggest that four ounce bottles be used, for if in larger bottles there will be the trouble, when a portion of it is poured off, of air taking its place, and the decomposition of the remainder more quickly follows than when no air is present. It is claimed by some that there is a difference in the energy of this solution, should the eikonogen be dissolved before the sulphite of soda is added; on this point I am not prepared to venture an opinion; I made it as directed and am highly pleased with its work for short exposures. Just how much the exposure can be reduced by the use of this new agent as compared to pyro, I am not prepared to state, but Mr. Cramer, of dry-plate fame, should certainly be admitted as authority, and in an article of his recently published he states, that in his opinion, the time is reduced about one-third; but this I can say, that the time of development is reduced at least to one-third of that required for development by pyro. In using this solution for the development of landscape work where full exposure has been given, I reduced it with water at the time of using, about one-third; this slows its action and gives better opportunity for deciding how far the development should be carried, for on a full-timed plate, if full strength is used, the action is so quick that the plate may go beyond the point you want it in intensity, before its details have been fully secured. An old solution or a solution which has been used in developing, added to the fresh mixture, is considered to be an advantage but it is difficult for an amateur to have on hand an old solution; there are often many days and sometimes many weeks intervening between the amateurs' development of plates, and the solution may be too old and may have deteriorated and almost decomposed.

I proceed as follows and find that the method works well,

and that the amount of developer used in proportion to the work done is greatly reduced in quantity. If, for instance, I have two dozen $6\frac{1}{2}x8\frac{1}{2}$ plates to develop, I would take say twenty-four ounces of the eikonogen, pour into two graduates six ounces each, develop a plate with each six ounces and for each two plates developed with the same six ounces I would add half an ounce of fresh solution to each graduate, keeping up the strength or energy of the solution until all of my two dozen plates are developed. This it will be found will not greatly increase the amount beyond the six ounces originally poured out for each plate, for the reason that more or less is lost in pouring back and forth from the graduate and dripping from the plate. The one-half ounce will only be sufficient to keep up the quantity of developer to the six ounces originally started with. By this simple means the developer is kept very nearly to its original energy, and a better uniformity of results is had than if four or five plates are developed in one solution without the addition of any fresh developer. Should at any time difficulty occur in obtaining sufficient intensity in the negative, a 10 per cent. solution of bromide of potash, added with judgment will produce the desired effect.

Chas. Wager Hull.

A HINT ON SQUEEGEEING.

A GREAT deal has been written during the past year on the squeegeeing of collodio-chloride prints, and there has seemed to be a great difference of opinion on the choice of the medium with which to prepare the surface of the glass or ebonite plate whichever is used. There seems to me to have been a great deal of energy misspent, and the labor which is daily wasted in rubbing the talc or beeswax on the plate might well be used to more advantage, as neither talc not beeswax nor any other medium is necessary.

I have myself squeegeed hundreds of aristo prints, and have seen many hundreds more squeegeed without the use of any, and cannot remember a single print lost by refusing to come off the plate. The method is extremely simple. Take a glass plate (any without scratches will do; if it is to be ground glass, only that with the finest grain obtainable should be used), or an ebonite plate if it is preferred, and wash it clean with plain water. A second wash with ammonia will do away with any fatty matter.

Once thoroughly cleaned there is no necessity for going through all this cleansing any more. A simple rinsing under the tap before using will put the plate into working order again. Take your *dried* print, immerse it into water till it lies flat and squeegee; when dry it can be drawn off the plate without any difficulty and will curl up into a neat little roll ready for mounting. The only precaution to be observed in this method is that the print should not be saturated with moisture. The reason for this is obvious. If the moisture penetrates through the layer of collodion to its support, it is more than likely that they would part company under the slightest persuasion. *Joseph Obermeyer.*

FUZZYNESS AND NATURALISM.

It is possible that a fad, at present confined to a few individuals here, may spread farther before it retires into obscurity. This fad consists in taking pictures so much out of focus as to produce a blurred, fuzzy effect, leaving much work for the imagination. Lenses of the worst conceivable description answer quite well in the production of these "fuzzytypes," and some even prefer to take them by a rather large pinhole instead of a lens. There is no detail whatever in them, this being left, as I have said, to the imagination on much the same principle as that which had a short run in the world of literature a few years ago, as for example—"Maria Jones yesterday invoked the aid of kerosene to light her fire; the funeral takes place on Thursday." Or—"When sitting on a barrel of gunpowder enjoying his pipe, Ben Bobstay let fall a spark; the crew were saved." There seems a desire to imitate by photography the scene-painter's art. We all know how by a few dashes of his brush the scene-painter can produce effects which, when viewed from a distance are really excellent, but which degenerate into terrible daubiness when the spectator approaches nearer.

The advisability of abstaining in some instances from making a photograph as sharp as it is possible to do has been recognized since the earliest days of the art. Especially is this desirable in the case of large portraits in which the delineation of the detail and rugosities of the skin is often offensive. It is worthy of notice that the necessity for softening the occasionally too excellent detail was recognized by Fox-Talbot long anterior to photography being a commerce. His method,

which cannot be improved upon, consisted in making the negative as sharp as possible, and when extra softness was wanted, interposing a sheet, or in some cases two or three sheets, of gelatine or waxed paper between the negative and the sensitive paper. Excellent effects as regards the suppression of detail can always be obtained in that way.

But let not "fuzzytypes" be confounded with the effects aimed at by the naturalistic school. The two things are different. In the former everything is blurred; in the latter the sharpness is confined to the dominant object in the composition, all other parts being rendered subordinate in respect of definition. This has long been recommended and practiced by our best photographers, and it accords with common sense and artistic taste of the most common character. In portraiture the practice indulged in by some of making the background and studio furniture as sharp as the portrait, is to be condemned. There is only one photograph, whether portrait or landscape, in which the greatest possible sharpness in every plane is not only desirable but necessary, and that is when the photograph is a binocular one, for when viewed in the stereoscope the eyes then relegate everything to their proper distance.

J. Traill Taylor.

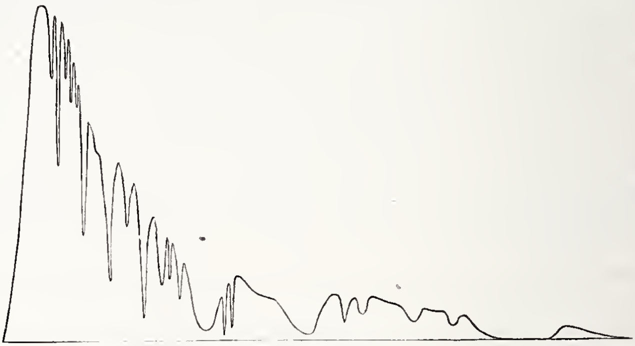
AN OUTLINE DRAWING CONVERTED INTO A GRADATION PHOTOGRAPH.

In illustrating his monograph on "The Solar and the Lunar spectrum" Secretary S. P. Langley of the Smithsonian Institution found it necessary to translate an outline profile drawing of the invisible solar spectrum, as measured by his bolometer into a gradation picture such as is seen in the visible spectrum.

Recourse was first had to shaded India ink drawings, but it was found impossible to get artists to correctly represent in light and shade the value of the elevations and depressions of the profile. He then directed his attention to photography; and finally devised a method which produced the desired results as illustrated in the following cut.

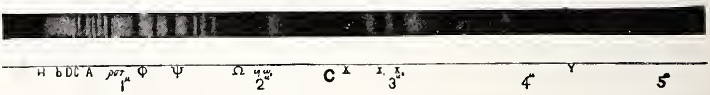
Fig. A represents the original drawing, showing the invisible spectrum as measured by the bolometer and which extends chiefly below the red end of the visible spectrum. Fig. B is the same drawing cut out and mounted on a black ground. A frame was provided sliding in a grooved base to carry this drawing. This frame was moved back and forth in a vertical

direction throughout the time of exposure; which was purposely prolonged by the use of a small diaphragm. Fig. C



A

B



represents the result of this in the finished picture, which represents this invisible spectrum as it would appear if it could be *seen*.

This photograph is used in Secretary Langley's paper published by the National Academy of Sciences, Vol. IV. Second Memoir, The Solar and The Lunar Spectrum.

Thomas W. Smillie.

PHOTOGRAPHING FLAMES WITH COLOR-SENSITIVE PLATES.

Photographic journals and books have for the last few years spoken repeatedly of attempts made to reproduce yellow and red with the highest possible intensity. By whatever agents these effects are produced, we distinguish two distinctly different light sources, one of which is the sun spectrum. Thousands of photographs made with the spectroscope upon color-sensitive plates have been made public, and it has been shown by them to what extent yellow and orange rays will act upon the photographic plate, without affecting the true value of other colors. When photographing flames, artificial light, fire-works, burning gases, etc., we meet with a series of highly interesting phenomena. Experiments in that direction can, however, be made at night only, and to be successful close attention to the properties of plates and working formulæ is necessary. Were we to photograph for example upon an ordinary bromide of silver gelatine emulsion plate, the gentle gas flame of a Bunsen burner, we would obtain only a very feeble light cone showing but little of the character of a flame, but a very different result would follow when burning in it small crystals of a sodium salt—a sharp and distinctly outlined picture of the flame, although the plate is in this case not at all sensitive for yellow light rays. Yellow rays are here non-actinic, and the sharp contours of the flame picture are produced by the particles of carbon alone, burning with blue light and thus becoming visible; but when the flame is colored more intensely, very interesting, finely detailed pictures may be made of it by instantaneous exposure and with a slit diaphragm. For such flame pictures, which furnish very valuable assistance in the examination of salts and light-refractions, we use very thinly coated emulsion plates, stained with strong solution of erythrosine (blue shade) in equal parts of alcohol and water. After drying these plates are bathed for a few minutes in a weak silver nitrate solution, 1 : 250, washed, and when dried again they are ready for exposure.

Such plates are highly sensitive for yellow and orange, but unfortunately they do not keep very well. With them I have photographed fire-works and electric sparks, with an intensity impossible to obtain by any other method. Moving flames may be correctly photographed by interposing ray filters of colors complemental to the color of the flame; the filters are either colored collodion films, celluloid laminæ or thin glass cells containing solutions of the required color.

Analyses of illuminating gas have been made by the employment of such plates, and the quantity of carbon particles consumed has been accurately determined. A photograph of lightning made by Prof. Kayser shows the ramifications of the flash to be of different color, for they are impressed upon the plate with different intensity.

I publish herewith a formula by which most powerful action of intense yellow flames has been had.

Dissolve 10 grains erythrosine (blue shade) in 500 c.c.m. of distilled water, and add 250 c.c.m. of alcohol. After being thoroughly dissolved add 10 c.c.m. of strongest ammonia, and allow the solution to stand till next day; filter, and it is ready for use. Bathe the gelatine plate in it for five minutes, dry and immerse them in a solution of 4 grams of nitrate of silver in 1,000 c.c.m. for from one to two minutes and dry again. To prevent fogging these operations must, of course, be performed in a very dark ruby light.

The richer the gelatine emulsion is in silver the more brilliant the results. *E. Obernetter.*

NOTES ON FLASH-LIGHT PRACTICE.

With the amateur photographer as with others, it is the unexpected that happens often. After my success in photographing a cobweb one morning about 6.30 o'clock, in the midst of a regular Bay of Fundy fog, and facing the sun to have its light reflected on the dew that covered the web—otherwise I could not take it—I thought I would try "flash-light" work. I found there were flash-light pictures and pictures made by the flash-light. It was the latter I wanted. I soon discovered that something more than a dark room and some powder burnt in a pan, was necessary to success; patience, experience gained by failure, and more or less defiance of "the rules," but plenty of common sense.

The greatest difficulty one meets with is in taking faces by flash-light, (i. e. in common rooms) the tendency being to have the weird and ghastly effect that the electric light gives in a ballroom. I have not yet been able to be sure of success every time in this respect. Doubtless, one difficulty lies in the difference there is in the volume of the flash-light, as well as in the quality, from the same manufacturer.

Then other and more important elements are in the wall paper of the room, light or dark carpets, draperies, etc. With papers of non-reflecting light colors I have tried to use two flashes, and these must always be from the same position

relatively to the camera, except in the case of a room beyond, or opening out of the principal room being taken. (See Fig. W.) The position of flash " By " must be such that no part of it can

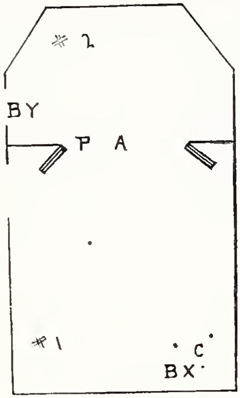


FIG. W.

No. 1. Parlor. No. 2. Conservatory. A. Folding doors. C. Camera. Bx. Position of flash in parlor. By. Position of flash in Conservatory.

get past " P," otherwise it will show into the Camera. In such a picture as this (Fig. W.) persons could be taken in the conservatory with capital effect.

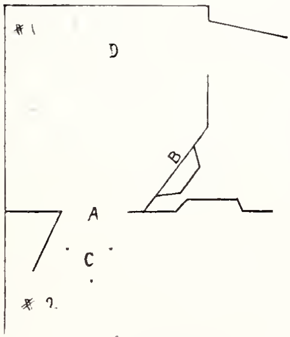


FIG. M.

No. 1. Library. No 2. Hall. A. Doorway. B. Position of flash. C. Camera. D. Subject.

A picture to better illustrate the interior effect may be seen (Fig. M.) and page 253. I darkened the Hall (No. 2) and the door opening (A) made a frame for the picture beyond.

Although the walls were covered with a light-absorbing color paper, by a brilliant flash at (B) I got the result desired. The title of this picture "The Overlook" has a double significance as the scene is in that bijou of a house "Overlook Cottage," Franklin Park, Boston, the residence of Wm. H. Rideing, Esq.

I often get excellent effects by flashing from behind a half-open door much nearer the subject than the camera is. Care must always be taken to protect the lens from the flash-light; experience, artistic taste and common sense will do the rest. While there are a great variety of lamps for flash-light use I have got my results from Pine's Lanp, and as to plates I find the Chautauqua perfectly satisfactory. The picture referred to was made with a No. 2 Darlot double hemispherical lens, but a wide angle lens can be used. The work by flash-light affords many opportunities for the amateur when days are occupied with business or a profession, since the evening hours are the best, and the dark room work can follow immediately. It is hardly necessary to refer to the many delightful domestic scenes that can be secured only in this way.

Horace P. Chandler.

SOMETHING ABOUT ALBUMS.

A frequent puzzle of those who make photographs for amusement is the question how to prepare their prints for preservation. The puzzle is generally solved by the prints being mounted on separate cards and all being thrown together into a library drawer—views made during last summer's yachting trip being mixed almost inextricably with copies from family daguerreotypes, scenes on the farm in the haying season, attempts at portraiture with the neighbor's baby as the unwilling subject, and winter views among the trees in the park.

My present mission is to suggest the use of albums, or some substitute for them, so that pictures may be classified into groups, safe from dispersion or loss, thus making it possible to find any given picture at a moment's notice. There is nothing very novel in the suggestion, but my experience in the practical application of it may be of value to someone whose experience happens to be more limited.

The art stores usually offer nothing more attractive for this purpose than stiff and angular scrap books, to the manilla pages of which unmounted photographs may be attached by one margin.

A practicable way of mounting prints on the pages of a book by pasting the whole surface of the print may exist, but I have not yet discovered it. Unless the pages of the book are of very heavy cardboard they are bound to warp, and if they are of heavy cardboard they will be stiff and awkward to handle.

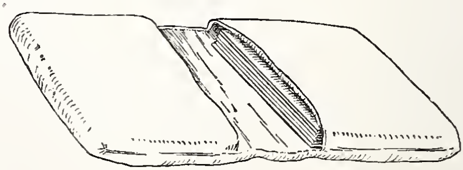
I have a collection of views which I made while on a camping trip in Maine, but the novelty and attractiveness of a birch-bark panel set in the leather of the cover and bearing in pen and ink a somewhat elaborate title, offer little compensation for the warping of the leaves caused by pasting the prints. The book when lying on the table refuses to remain closed, and the curling of the leaves gives it such an untidy look as a book would have if a clumsy jack-knife were left in it to mark the place where one had left off reading. My views made during a subsequent camping expedition are mounted (as they should be) by means of a narrow strip of paste at the left-hand edge of the print, and the prints are pasted on the right-hand pages of the book, but as no stubs were introduced at the back in stitching the book to make up for the thickness of the prints, this book also, with its odd cover of tent duck lettered with a pen, refuses to lie flat and is something of a disappointment.

My most satisfactory effort in this line is two sets (duplicates) of forty odd 4x5 views each, made with a detective camera while on a trip to New Orleans last spring. The albums are books of white unruled writing paper, 6½x8 inches. They are covered with pebbled black leather and have flexible covers, round corners and gilt edges, and cost 85 cents each. For one who hires his printing done the cost of the book is about equal to the amount which he saves by leaving the prints unmounted. An unmounted print, if burnished, however, generally costs the same as the print would if on a plain mount.

The views in these sets include, besides the ordinary prints on albumen paper, a sprinkling of platinotypes, bromides and blue prints, according to the subjects and the printing quality of the negatives. The different colors give a pleasing variety, and monotony is still further avoided by printing many of the pictures with masks, giving different sizes of ovals, circles, and rectangles. Some are printed to the very edge of the paper, and others have a white margin of an eighth of an inch. In all cases they are mounted on the leaves of the book by starch paste applied to the inner edge only of the print.

The books happened to contain 62 leaves each. I cut out every third leaf, using a penknife and ruler, with a sheet of glass under the leaf which I was cutting. This elimination of leaves compensated in part for the thickness of the prints, and the flexibility of the covers did away completely with the dreadful angularity and stiffness of my earlier efforts and of scrap books.

A title-page was the only thing lacking. On a large sheet of white paper I drew with a crayon the words "New Orleans. 1890," the inscription being about three feet long. This paper I fastened to a storm door which was enjoying its summer vacation, and laid it on the ground. I had brought back from the South a couple of young alligators, each about ten inches long, and these I turned loose on the title-page. Holding the camera in my hands, I made a snap shot vertically downward, and from the resulting negative made a couple of bromide prints, and these were my title-pages.



Another set of my views is contained in a plush case something like a pocket ticket case, only of course larger. It is of dark olive green plush with yellow satin lining and violet sachet powder introduced in making up. The views are on

maroon mounts with bevelled gilt edges. A handsome thing for a set of camping views would be a similar case of gray pongee silk lined with white satin. This would require cotton batting between the cover and the lining to give it body. A spray of fir with a fir cone or two should be embroidered on the pongee in olive green or brown, or perhaps with the needles in dark green and the cones in brown. I think it could be given a "woodsy" odor by the use of a moderate quantity of fir balsam, such as is used for pillows, quilted to the lining.

Samuel Merrill.

TINTS OF PRINTS MADE ON DIRECT PRINTING PLATINOTYPE PAPER

While working with direct printing platinotype paper in Vienna last June, I noticed that the various prints turned out to be tinted more or less unlike, some being quite black, some blackish brown, others of a sepia hue. Now this was a curious state of affairs, considering that the paper used had all been of one and the same package. What could be the cause of these various tints?

As beautiful as some of the prints really were, it was nevertheless quite provoking to get a sepia print when a black one was desired and *vice-versa.* Setting about to find out how to be able and control this I soon arrived at the following rules:

I. Paper kept *perfectly dry* until printing is finished and then developed with steam gives prints of a rich black tint.

II. Paper kept perfectly dry until used, and steamed a little before being put into the frame for printing purposes gives prints of a brownish black tint.

III. Paper kept perfectly dry until wanted and steamed thoroughly before printing gives prints of a rich brown color.

IV. Paper not stored away in a calcium tube before use and steamed before printing produces pictures of a sepia tint as a rule, with the whites not quite pure.

Out of these rules it is obvious what an important rôle the hygroscopic state of this kind of paper before and during printing plays.

Note.—In order to produce better prints from thin negatives coat the *back* of the glass negative with *matt varnish colored with a light green aniline dye.*

Alfred Stieglitz.

REALISM IN PHOTOGRAPHY.

The first lesson in realism in photography that I had was derived some twenty-five years ago from some photographs which came from the studio of the lamented Max Petsch, of Berlin. They were sent to me by Dr. Vogel, the editor of *The Photographic Mittheilungen.* They were of little children in various attitudes, caught while at play with their toys and in their other baby avocations, and they were very charming indeed. They were made by the wet process, and they were wonderful.

The little ones, instead of being posed, as many American photographers posed them then, and continue to pose them now, stark and stiff, amidst incongruous accessories and backed by goblin backgrounds, were taken in their natural attitudes with home surroundings and harmonious accessories, which were simply catching in every sense of the word.

I remember, too, that Mr. Petsch wrote a letter to me as the editor of the *Philadelphia Photographer*, from which I caught this thought, that it was a good plan for the photographer to close the gallery to the public for a week every year and take a grand holiday with his appliances in the studio. Moreover, to put all the art knowledge and feeling he could possibly conserve into two or three realistic composition pictures, making them groups or single figures as preferred, and as life-like as could be without infringing upon harmony and the other principles of art. If no business came from such pictures they were considered by Mr. Petsch as an excellent means of practice and as bringing a rich reward before the next annual holiday week came around.

I cannot say conscientiously that I have always followed the plan of Mr. Petsch, but I have many times practically done the same thing, and I believe that, as a result, my work has improved under my hands very greatly. Indeed, sometimes when I am searching in the racks for an old-time wet-plate negative, and come to the pictures which I once looked upon as my best, I stop, look at them and grow ashamed of the fact that I ever allowed such results and effects to go out upon cardboards with my name printed upon them; but now, after a quarter of a century of such practice, I read here and there that realism in photography is not the thing to be sought after; that it is all wrong; that photographers have no right to attempt works of art or to call their productions works of art; and sometimes I feel a little snubbed; but be sure I do

not feel suppressed. What I want to say particularly to my friends and co-workers is, that while it may be somewhat true that photography may never hope to produce "real works of art," it has every chance of producing artistic works. Too much realism in photography, it is true, would spoil the results. There is a half-way path between, which photography can fill. It would indeed be too much to expect the photographer, with the little contact he has with his subjects, to produce such results as were those of the "old masters." But again, the photographer has advantages which the "old masters" had not, and which the "new masters" cannot have. If, by some inspiring act or good fortune the very best of the subject can be brought out into the face, then the photographer has the power in his hands to instantly catch in that best view, that which in a hundred sittings the painter could never catch, and which all the deft handling of the brush could never produce. This faculty, this power and strength on the part of photography will evermore give it the power to produce excellent results, which are not only realistic, properly, but artistic. Thus far, I think, we can go and no further; but whatever we do, let us *keep going* just as far as we can.

Edward L. Wilson.

MARINE PICTURE MAKING.

To produce a satisfactory negative of a waterscape is about as easy as securing an opportunity to photograph a deer. A hunter uses as a means to secure his game various contrivances; these taken together with a perfect knowledge of the caprices and habits of animals secures for him the object desired. In a similar manner photographic enthusiasts should become acquainted with the peculiarities of that with which they shoot and the objects shot at.

Most hand cameras are not specially designed for marine picture making. Lenses of long focus and double combination are in the majority. Cameras containing such lenses are of little use in marine work as they can only be used on the point at which focus is taken. Move within a radius of a few feet from the focus point and the subject is beautifully out of focus especially if such subject be a small boat within the point known as universal focus.

Single lenses possess the peculiarity of enabling the operator to move in a radius of several feet from this focusing spot or point.

With such lenses one secures greater depth in the picture.

Wide-angle lenses are especially adapted for this class of work, from the fact of their portraying the various distances, as if upon one plane. The increase of angle is desirable in close work.

A Waterbury hand camera has the advantage over most of the detective cameras in the market in this respect. When set on the universal focus of sixty feet, objects coming within twenty-five feet are rendered perfectly sharp. So much for the cameras—now for practice.

Most amateurs in picture making upon the water photograph with the light direct upon the subject; this certainly is conducive of very poor negative results—negatives lack contrast, roundness and brilliancy. The sky is a high light, the horizon second only to this, the water a powerful reflector; we have nothing but light devoid of shadow.

To produce a harmonious marine negative shadow must be introduced. This is easily accomplished by photographing toward the source of illumination at angles varying from 45 to 90 degs.

A hood should be placed in front of shutter opening to protect the lens from direct rays of light. This is fastened to the camera by a flange similar to those used for lenses.

For this work medium fast plates should be used—extremely rapid plates the exception. If rapid plates are timed correctly a fine negative results; if short of time, foggy, flat negatives are obtained. By forcing the development chemical fog is the result. The plate-maker stopped speeding the emulsion just short of this fog. Use a medium fast plate which gives more latitude in the development.

The illustrations accompanying this sketch were made with the smaller diaphragm of the Waterbury, with the shutter at its highest speed and the projecting hood as mentioned above.

Cramer No. 40 plates were used and developed with alkaline pyro as follows:

ALKALINE SOLUTION.

Water (distilled)	20 ounces
Soda carbonate (C. P)	1 ounce
Natrium sulphite	1 ounce
Concentrated ammonia	2 drops
Bromide potash	30 grains

PYRO SOLUTION.

Water (distilled)	10 ounces
Pyro	1 ounce
Nitric acid	5 minims

Negative by Horace P. Chandler. Kurtz Process.

IN THE LIBRARY.

(A Flash Light Study.)

For developer, 1 ounce of alkali solution and 1 dram of pyro solution. Development completed in one minute.

In giving these few hints to the ANNUAL readers I have but described the method of producing some of the scenes of New York bay during the yachting season, by a favorite hand camera.

A. Peebles Smith.

HOME PORTRAITURE.

FOR a long time after enlisting in the army of "camera cranks," my attention was given to making a good landscape negative. When I could do this with fair success and had dabbled a little in interiors, I cast longing glances at the portrait work of my more advanced confreres.

Deciding at least to make an attempt in that line, I picked up a second-hand lens and using the gallery of a friend turned out several presentable portraits.

Attempting the same work at home with the ordinary light, I found it impossible to make a soft negative. The face when turned toward the light was hard, with no detail, and the glare gave a decided squint to the eyes.

If, again, the face was turned away from the light, I had a fine picture of the hair, but even the victim's best friend was not able to recognize the black apology for a face.

My sources of light were windows such as are common in city dwellings, and the light came too strong and from the side instead of overhead. By some means it had to be diffused and softened. My arrangements to overcome this difficulty were simple, and may be of interest to others laboring under the same restrictions.

Take several sheets of paraffined tissue paper, such as are cut in small squares and wrapped around caramels, paste them together in a strip the size of the window, roll the strip around a common curtain roller and screw the fixtures to a board about the length of the window sill. Across the loose end of the paper fix a curtain-stick with a small hook in the centre, this can be hooked into the ring at the bottom of the curtain proper, and the tissue paper unrolls as the curtain is rolled up, graduating the light as desired.

A child's hoop, with fine white cotton cloth stretched over it, makes a good reflector to lighten up the heavy shadows, and a support for this can be easily made as follows: Take a

strip of inch pine for the upright, three feet long and three inches wide. Commence three inches from the upper end and cut a slot three-eighths of an inch wide and eighteen inches long, and for a base nail two three-foot strips to the bottom of the upright in the form a cross.

Bore a hole at the centre of a strip one and a half inches wide and nail it edgewise to the back of the hoop. Bore a hole at each end of a strip eighteen inches long. Bolt one end to the brace on the back of the hoop with a thumbscrew, and bolt the other end through the slot in the upright.

You will now have a reflector that can be raised, lowered, and set at any angle desired.

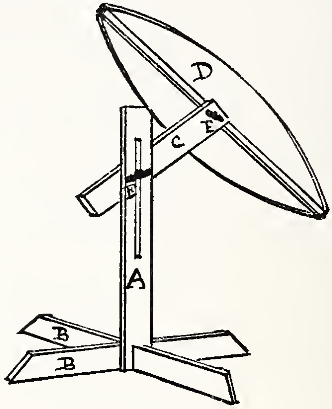


Fig. 1.

A good background was necessary, and after a number of experiments, I found two were sufficient, one of soft drab felt, and the other of unbleached cotton.

I bought four yards of extra-wide unbleached cotton sheeting. This gave me a screen seven feet high, with a five-foot flap at the bottom to pull forward on the floor for the subject to stand on. Using this the figure in the picture stands out in bold relief against a white ground that is unbroken at the floor line.

This ground I also found useful for "mugging" numerous canine divinities of my lady friends.

As space is of considerable importance in a city house, my frame to stretch the backgrounds on must necessarily fold. To accomplish this take four strips of inch pine three inches

wide, twó seven feet long for uprights, and two five and one-half feet long for horizontal cross-braces.

Cut square mortises one inch wide in the bottoms of the uprights and nail in strips for feet. Bolt the end of one cross-brace about twelve inches up from the floor on one upright, and bolt the remaining brace to the top of the other. This leaves a brace attached to each upright, allowing the whole to fold easily.

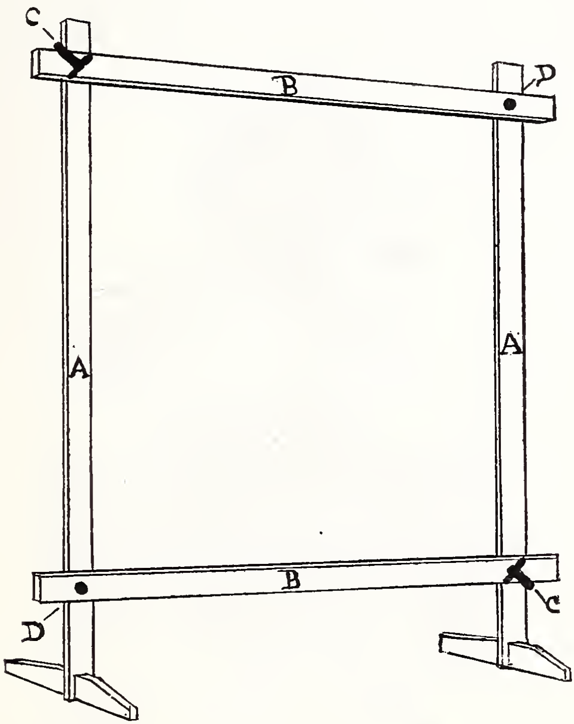


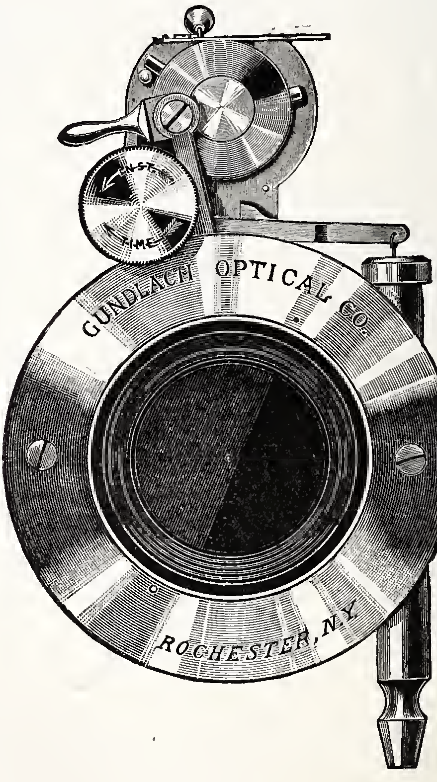
FIG. 2.

Begin at the top and tack the unbleached cotton by the edges to the outside of the uprights. Force the two uprights as far apart as possible until the cotton is stretched smoothly, and secure the loose ends of the horizontal braces to the uprights with small iron clamps. This should give you an unwrinkled background.

The felt comes six feet wide. The easiest way to stretch it on the frame is to drive wire nails an inch long, every six inches in the edges of the uprights, leaving the heads protruding about one-quarter of an inch. Brace the edges of the felt over these nails with a needle and stout string, leaving one end of the string to untie, so the felt can be removed.

Benj. P. Richardson.

A NEW PHOTOGRAPHIC SHUTTER.



I HEREWITH present illustrations of a new time and instantaneous shutter made by the Gundlach Optical Co. of Rochester, N. Y. One of the novel features of this shutter is that it

opens *parallel* and in such a manner as to form a symmetrical figure with the center of the lens, at every moment during opening and closing, or, more strictly speaking, that every point of the aperture has its corresponding opposite point relative to and at equal distance from the center of the lens.

It has been claimed that the aperture, or diaphragm, of a photographic objective ought to be circular in order to produce a sharp and undistorted picture. This is not correct. Any shape of diaphragm, square, rectangle, or even the shape of a star can produce a perfect picture, as well as the circular form, *provided the figure is such that every point of it has its corresponding opposite point at the other side of the center, or, is symmetrical from the optical center*, or axis of the lens.

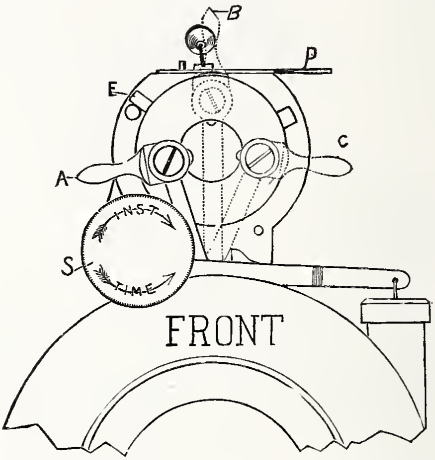
On the other hand, any shape of the diaphragm, or aperture of the shutter during its opening or closing (if situated between the lenses) not being symmetrical with the center as described, will cause *a corresponding amount of distortion*, both spherical and chromatic, just the same as a lens will that is not well centered. Furthermore, there are some such shutters that do not comply with this optical condition, but are so devised that, during opening and shutting, the greater part, or area, of the aperture is situated below the center of the lens, claiming for this arrangement the advantage, that the light of the sky is correspondingly diminished, and that of the foreground increased. This, too, is untrue. Any diaphragm situated between the lenses, will distribute the light in perfectly equal proportion over the entire plate, no matter whether such opening is in the center or out of it, or what its shape may be. But, if eccentrically situated or not symmetrically shaped it will produce a correspondingly *distorted picture*.

The blades being pivoted at diametrically opposite points their centrifugal force is well balanced and, consequently, the jar is reduced to a minimum. The great advantages of the parallel or symmetrical opening of this shutter over any other known device are obvious.

Another valuable novelty in this shutter is the combination of the bulb-pressing and releasing plan (instead of *pressing only* for both opening and shutting) with the spring motion. The pressing and releasing (for time exposure) do not immediately actuate the mechanism of the blades, but merely give the *impulse* for its action while the driving power is furnished by the watch spring the same as for instantaneous exposure. This arrangement has the advantage that extremely short time exposures, such as $\frac{1}{20}$ second or even shorter,

can be obtained with great ease. On the other hand exposures of any desired length can be made with perfect safety; while this is very limited with shutters where the pressing and releasing serves as the direct driving power for the blades.

The shutter is independent from the diaphragm apparatus, and always opens to the full aperture, no matter how small the stop used. This arrangement is not new, but was adopted in preference to the "diaphragm shutter" plan, because of its important advantages over the latter, viz: Only a small fraction of the time of motion or action is occupied by the opening and shutting thus allowing for the passage of light the full



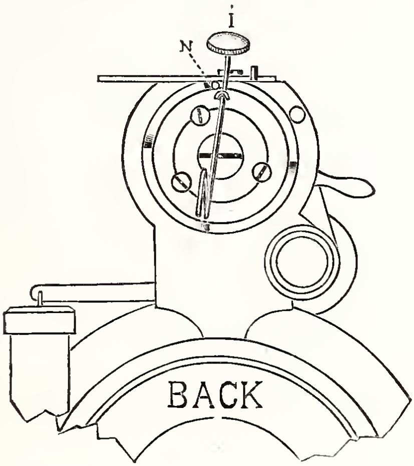
aperture of the stop during almost the whole time of exposure, and this the more so the smaller the stop used. This advantage is greatly increased by the semi-circular motion of the upper end of the link which connects the barrel with the blades, this kind of motion causing a most rapid opening and shutting, while the blades move very slowly when near the full aperture.

The blades are much smaller and lighter than is possible with any diaphragm shutter, thus requiring much less power for a given speed, and consequently causes much less jar to the camera than the diaphragm shutter.

The shutter is very simple in its construction, as well as in its operation, and is *very compact*, the case of a $6\frac{1}{2}$x$8\frac{1}{2}$ with an opening of $1\frac{3}{16}$ inch, being less than 3 inches in diameter.

Directions for Use.

For focusing turn the handle, *a* upward to the position, *b* and then move the lever *d* forward so as to catch behind the pin, *e* thus holding the shutter open. When through with focusing move the handle *a* to the position *c*, which winds up the driving spring, and closes the shutter. Then turn the lever *d* back to its original position. Do not fail to do this, or else, after pressing the bulb, the shutter would remain open and thus cause a failure.



For *time* exposure turn the thumb-screw, *s*, *as far as it will go* in the direction indicated by the arrow "Time;" insert diaphragm into the slot, and open the plate holder. To expose press the bulb *and keep it thus pressed for the time required for the exposure* and then release it. The *pressure* of the bulb opens the shutter, the *release closes* it. Exposures as short as one-tenth second may be made with ease by this arrangement, and if, instead of pressing the bulb, it be laid on the open hand and a quick blow be given with the other hand, the time of exposure may be reduced to one-twentieth second, or even less.

For instantaneous exposure turn the thumb screw, *s*, *as far as it will go*, in the direction indicated by the arrow "Inst." A gentle pressure of the bulb will then be sufficient to complete the exposure. The speed adjustment for instantaneous action is situated back of the mechanism and its operation is easily understood. When the wire spring, *i*, is placed at the imme-

diate right of the stop *pin*, as shown in the diagram, the speed will be at its lowest; when the spring is turned around so as to be at the immediate left of the stop pin and resting in the notch, *n*, the tension of the driving spring is increased by a full turn and the speed is at its highest. For time exposures the *lowest speed should always be used.*

This shutter is not intended for use in cases where a very long time of exposure is required; such, for instance, as dark interiors. In such cases no shutter can offer any advantage over the ordinary use of the cap, as especial care not to shake the camera need not then be taken. The shutter is, however, so arranged that it can be used for such exposures if desired, in the following way: After focusing do not turn the lever, *d*, back, but leave it in the position required for focusing. Turn the handle, *a*, to the position, *c;* insert the diaphragm; open the holder. To expose, give the bulb a pressure and let it go. When the time of exposure is over, turn the lever, *d*, backward so as to release the pin, *e*, which will cause the shutter to close. *Ernst Gundlach.*

ADVICE TO BEGINNERS.

He who essays photography either as an amusement, as a means of recording the scenes of travel, or as an aid in the study of another science must first make himself master of landscape photography in its simplest form. How many are there who, either by reason of their own untutored judgment or by the misleading advice of others, begin the study in entirely the wrong way—try all manner of snap shots, copying and portrait work—use plates boasting the very hightest sensitometer number and compound successively each and every new developer; what wonder that they become tired of their continued poor success, and soon drop from the ranks?

A few words of kindly advice would have saved the writer many discouraging failures; and to those who have failed, or are about to begin this fascinating study, are these few words addressed.

First, select a small sized square camera without rack and pinion, or other unnecessary appliance. The "76" pattern by the American Optical Co. of $4\frac{3}{4}$x$6\frac{1}{2}$, the English half-plate size, is admirable. The lens should be the best you can afford, and of the rectilinear type having an equivalent focus equal to the base of the plate you intend to use, say in this case seven inches, which will give an angle of view of about 50 deg. Such a lens

would be used ninety per cent of the time had you several at your command. Until you can reasonably expect to produce a picture as well as a good negative from every plate exposed, and this will hardly occur during the first summer's work, I strongly advise you to take but two plates, the contents of one double holder, into the field as a part of your outfit. The reasons are many and obvious. You then have no plates to waste and will look about with much thought before selecting the point of view, and will be more cautious in giving to it the most artistic arrangement of its component parts, and having done this, the lighting and exposure will receive the same careful consideration; in fine, that painstaking care will be devoted to these two plates, both in the field and in the dark-room, which might have been distributed among many, and the result in pictures and in knowledge gained, will probably be far more satisfactory than had a dozen plates been exposed. The note-book should be your constant companion; in it record not only the scene, but the date, time of day, condition of light, exposure, and any remarks concerning the character of the view which may help you in developing, or in case you are obliged to correct the exposure. Select a *slow*, thickly coated landscape plate of some well known brand, and continue to use it for time exposures to the exclusion of all others.

Now a few words upon those much belabored subjects, developers and development. The beginner ought at first to thoroughly learn the alkaline pyro development; he will probably firmly adhere to this method, using the newer developers only in certain processes for which they are especially fitted. There need be but very few formulas for pyro developers; pyrogallic acid and an alkali—either liquid ammonia, or the carbonates of potash and soda are the requisite component parts. Ammonia, though most excellent, seems hardly fitted for beginners' use by reason of its rapidity of action and liability to fog when used by an unpracticed hand. Potash is thought to give extra brilliancy, but is not so stable a product as soda, which gives perhaps more softness, and is the writer's preference. A few drops of sulphuric acid acts as a preservative to the pyro solution, and a certain quantity of sulphite of soda in crystals, say four ounces to the ounce of pyro, prevents too great staining of the plate. Whatever formula you use find out at once how many grains of pyro and of alkali is contained in one dram of either solution, and then try to use the developer understandingly. You will hardly have success if you use the normal developer recommended in the formula for

the reason that it is intended for a perfecly normal exposure, and such exposures are rare in varied landscape work.

Take for instance,

Pyro	4 grains
Soda or potash	10 grains
Water	4 ounces

Flow over the plate and after a few minutes add if needful one grain of the alkali at a time till all detail is out; then, if necessary, add two or three grains of pyro to bring out the pluck and density. The negative at this stage should fairly sparkle with brilliancy. This way of developing gives room for ample exposure; if the view is flat or wanting in contrast begin with a little extra pyro. The finished negative after being washed and dried should not be absolutely black and white; the clear glass should be pure and clear, but the darker parts of the negative should assume a faint chocolate or plum color, difficult to describe; herein lies much of the beauty and warmth of tone in the finished print. Master the albumen print in the same painstaking way recommended for the negative; it is and probably always will be The Photograph, and should at any rate be thoroughly understood before using other printing papers.

Select a simple toning bath of gold and water, made alkaline with bicarbonate of soda. This bath will not keep, but gives excellent warm, deep prints, if they are but reddened with a salt solution before toning. Prints should be neatly and artistically mounted, and in this vital point many amateurs and others as well are sadly careless. Most landscape prints, especially such as contain any amount of foliage, look extremely well mounted on heavy maroon cards with half an inch margin; but it is, perhaps, needless to say that the tone of the print must exactly match that of the mounts. This, however, is easy of attainment after some practice.

Examine the work of others, but do not criticise. Remember that the study of art goes hand in hand with that of photography.

And now let me say to those who take up this fascinating study that there will be hard work and many failures; but we fail to learn, and success will surely crown the efforts of him who is painstaking in his work and enthusiastic in his endeavors to attain the best results.

J. M. Bemis.

THE APPLICATION OF MICRO-PHOTOGRAPHIC APPARATUS TO THE PHOTOGRAPHING OF SUN ECLIPSES.

Attempts have been made repeatedly to use a microscopic apparatus to photograph very far remote objects. With terrestrial objects the frequently insufficient illumination of the subject and the consequent difficulty of obtaining sharp focus as much as the enormously long exposure required have been obstacles to the practical application of the method, although very satisfactory results have been recorded. It is easily understood that these obstacles do not intervene when we try to photograph the most powerful light source, the Sun ; on the contrary, we must, by extremely short exposures, the interposition of monochrome dye stuff solutions, by the inserting of comparatively small stops to adjust focal differences, and to increase sharpness of the image, reduce very considerably the intensity of illumination.

To describe briefly the adjustments to the apparatus, it should be said at first that any perfect micro-photographic apparatus* consists of three principal parts, namely, the camera, the microscope, and an optical stage upon which all auxiliary apparatus, bulls-eye, diaphragms, heliostat or artificial light source are accurately centered and made moveable.

For our special purpose the whole apparatus is placed upon a table contiguous to an appropriately situated window the heliostat is placed upon one end, or instead of it a plane mirror, movable in all possible directions. Then erect two accurately centered diaphragms of exactly equal apertures and distant from each other 20 to 30 c.m. to control the direction of the sun rays transmitted through them. The bundle of light rays passing through the first aperture, must pass exactly through the second, which must be so accurately and carefully centered, that not the least light falls upon its margins. The relation of the two diaphragms to each other must be kept constantly in view and especially so immediately before exposure, by turning the movable plane mirror in short intervals, and in proportion to the apparent motion of the sun. Back of the second diaphragm, and in close proximity to it, place a monochrome light filter, a glass cell containing for example a solution of cupric ammonio sulphate, and after that an accurately centered condensing lens, preferably one of the Zeiss

* In all his works on the subject, the author adopts the term micro-photographic in contradiction to the American and English photo micrographic.—Translator.

type, an acromatic microscopic objective or finally a well centered photographic objective.

It is the purpose of these lenses to produce a small sun picture, which by appropriate shifting of the first upon the optical stage and by means of a condensing lens, or a photographic or well centered microscopic objective, to place the projected picture at about the height of the objective table of the microscope. When in the erection of the individual parts of the apparatus every one of them has been accurately centered, the sun picture falls upon the ground glass in the usual manner and is sharply focused by the aid of a microscopic objective of medium power, and with or without the use of an ocular.

In regard to time of exposure it should be said, that even with intense and concentrated light filters it need be but instantaneous. The filter is to be interposed either immediately before the condenser or the respective lens combination. A drop shutter with rectangular opening, or a rotating disc sectorially cut will do well for instantaneous exposure. The release should be effected by pneumatic pressure.

To understand the proportions of size of these pictures it may be mentioned that when made, for example, with an apochromatic microscopic objective by C. Zeiss of Jena, of 16 m. m. equivalent focus and 0.30 numerated aperture, a sun picture of 0.15 m. m. is projected. By enlarging it 300 times the diameter will be 45 m. m.

For this method of photographing the sun, or respectively a partial eclipse, we may not be able to claim perfection, nevertheless it may induce many microscopists to experiment, and make their instrument useful in that direction.

Gottlieb Marktanner-Turneretscher.

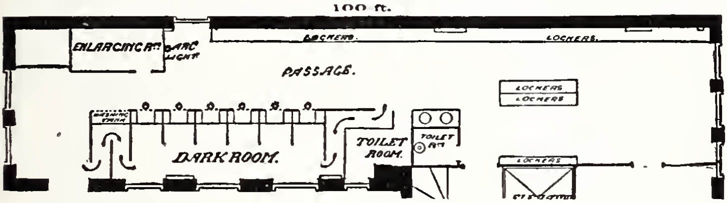
DARK-ROOMS OF THE NEW YORK SOCIETY OF AMATEUR PHOTOGRAPHERS.

In the new quarters at 113 West 38th Street, New York, the Society, through its Special Committee, has devoted considerable attention to the construction of its dark-rooms, desiring to make them as complete as possible.

One large floor in the Telephone Building is leased by the Society and is in the form of the capital letter U. The east wing, set apart as a work-room, is one hundred feet long by twenty feet wide, having along the wall over a hundred lockers for the use of members.

On the rear of the room, opposite the line of lockers, is the main dark-room, forty feet long by eight feet wide, the walls of which are painted an olive-brown color.

The entrances at each end are without doors and are made something like the letter S, which excludes daylight and permits one to enter easily. The annexed diagram shows the general arrangement.



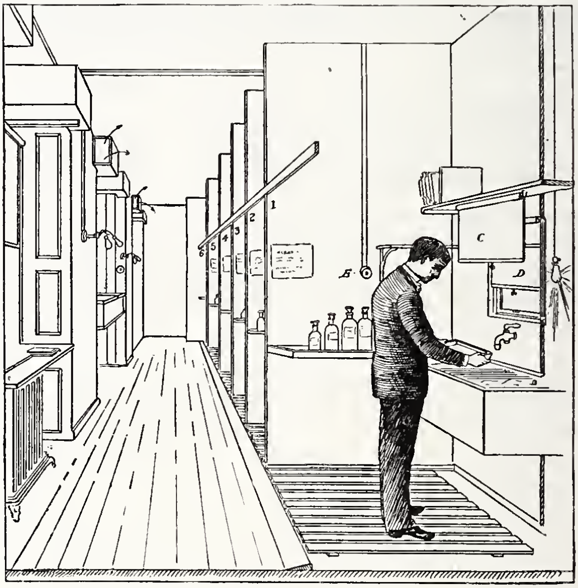
The arrows indicate the winding entrance.
The six developing compartments are shown by the short lines.
The short dotted lines are windows in front of the sinks.
The single dots with projections are the incandescent electric lights.
The three outside windows in the back of the room are represented by the open lines.

As will be seen in the general view of the dark-room it has arranged on one side a row of separate rooms, like stalls, each one being four feet one inch wide and fitted with sink, curtains twenty-two inches square, shelves, washing tank and hypo tank, as shown.

Part of one room is noticed on the right, the figure giving an excellent idea of the roominess and size of the compartment. The electric light is seen on the outside, controlled by the key-switch, E, on the inside. A balanced window sash holding two panes of glass twenty-two inches square, between which are six sheets of yellow post-office paper, greased, giving a safe light that may be still further moderated by a yellow curtain, D, attached to the underside of an overhead shelf. The floor of each stall is made waterproof by being lined with lead, over which rests a wood slat bottom. On the left is seen the steam heater, and just beyond is located the electric light contact printing box, having a lid on it at one end for inserting the printing frame. Just above the box is a push for turning on or off the electric light located inside of the box at one end. On the same side of the room there are three windows covered with black paper in part and also ruby paper. At the top of each window is fixed a wood inverted U-shaped ventil-

ating box painted olive-brown inside, allowing the fresh air to enter but excluding the light; the arrows show the inflow of air.

On the wall are two sets of electric light brackets, one fitted with a ruby globe, the other with a plain globe. Each compartment is numbered, and has hung on the wall the printed formula of standard developers.



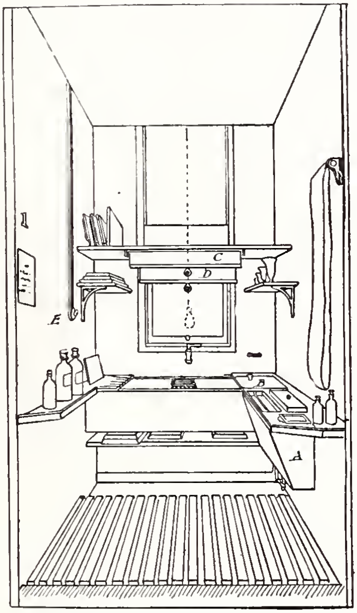
General View of the Dark-Room.

The view of the dark-room compartment is as it appears from the rear of the dark-room. A is a wood hypo dip bath, $15\frac{3}{4}$x$15\frac{3}{4}$ and 5 inches thick, outside measure, having a faucet in the bottom to let the waste solution out. A fresh bath is mixed up each day. The box is provided with two wood slatted dippers, which are separated by a narrow strip of wood running lengthwise down each of the inner sides of the box, permitting two plates to be fixed at once. A lid closes the top of the box, making it flush with the shelf.

B is the washing tank, $7\frac{3}{4}$ inches in width by 11 inches deep, forming part of the sink, in which the water enters at the

bottom, and overflows at the top. The whole sink is 4 feet 1 inch long, 18 inches wide, 11 inches deep. The supply faucet is just above the inner end. A special, light galvanized wire, basket for holding the plates to be washed after fixing, fits into the box.

C is an inner black curtain about eight inches behind D, which is a yellow or orange colored curtain next to the window. The advantage of the black curtain, C, is that it can be drawn



A Dark-Room Compartment.

partly down, and thus screen the eyes from the light of the window, enabling one to perfectly watch the development of a plate in the tray supported on the sliding grated shelf on top of the sink.

E is the electric switch-button for regulating the electric light outside as shown in dotted lines. On the left of the sink is a small shelf with radial draining grooves leading into the sink. The overhead shelf is intended for the storage of trays. Another shelf under the sink holds large trays.

The wood-slatted floor rests on the lead covered floor below. Only the portion of the floor in the compartment is lined with lead, and connection is made with each compartment at the floor, so that any water or liquid spilled on the floor will drain off to an auxiliary wastepipe. Should any of the sinks become stopped and the water be left running, the overflow falling upon the leaded floor will be carried off by the auxiliary waste. A towel rack with an endless towel is observed hung from the right-hand wall of the compartment. The supply faucet in the centre, just under the window, has a rose nozzle for spreading or spraying the water. If white light is wanted the sash is simply raised.

When the dark room is not in use all of the sashes may be raised and the place thoroughly aired. In the center of the winding entrances are hung ruby colored electric lamps regulated by a switch outside.

Referring to the diagram an extra large washing tank is placed at the end of the dark-room just outside of the winding entrance. The floor around this tank extending over to the enlarging dark room is lined with lead and covered with a slatted bottom. The space in the corner is occupied by shelves and drying racks for drying the negatives.

The bromide enlarging dark-room is fitted up inside with a large enlarging easel and an enlarging camera attached to the end wall near the door, opposite an opening to admit light. There are switches inside also for giving white or ruby electric light at will, and for turning on or off the electric arc light, hung from a bracket outside the room at the point marked " arc light."

A large 11 x 14 enlarging and reducing camera utilizes the window shown near the arc light. Another movable stand holds a studio camera for copying and lantern slide making. The electric light is used for illuminating negatives at night and on dark days.

Two toilet rooms are located near the front entrance of the dark-room, and are fitted up with the latest sanitary improvements. In the front portion of the work-room there is a large work-table just in front of a cluster of lockers, also a work-bench running along in front of the windows which front on the street and face south. The bench is also utilized for silver printing.

In connection with the spacious and handsomely furnished and carpeted library and club room, the reading room arranged with special shelves or racks for holding respectively all the

Negative by J. P. Davis. Levytype Co., Phila.

THE COUNTY FAIR.

foreign and American journals, and the roomy and conveniently arranged lecture room, a hundred feet long, the facilities and advantages afforded to members of the society are unsurpassed.

The incandescent electric light furnished by the Edison Co., is used exclusively and a swift elevator conveys visitors from the street floor to the society rooms.

The rapid increase in the membership of the society in con sequence of the improved facilities places it at the head of all others in this country in point of numbers. There are very nearly two hundred and fifty members.

"The Journal of the Society," published at its expense, is distributed gratuitously to all members, and is of special value to out-of-town members who cannot attend the meetings.

It is by means of such scientific societies that the new things in photography are tried and perfected, and it is a satisfaction to see advanced ideas as applied to practical photographic work so well carried out as they have been by the New York society.

F. C. Beach.

MOONLIGHT EFFECTS.

How many of us have seen the beautiful transparencies of Niagara Falls by moonlight, and have wondered how they were made?

The process is simple enough, and any one with a camera adapted for plates, may make similar ones. The first thing essential is a good day, for our so-called "moonlights" are taken in broad sunshine; the best effects are obtained on a day when the sky is filled with clouds; then toward sunset select a view overlooking a strip of water, and point your camera directly at the sun; use a slow plate—the Carbutt "B" is a good one, or a slow orthochromatic is even better.

Now if you can get a boat to glide across the sunlit strip of water, the effect is much improved; as the sun is just going behind a cloud make a slow instantaneous shot, and our moonlight is taken. Then comes the developing. Use a weak developer, for if we wish to preserve the cloud effects, we must go slow, and to make a good moonlight we do not want too much detail in the shadows. The sun will develop up into a positive, and we must cut out a little round piece of black paper and stick on the negative over it. Print very deep, and you will have for your trouble, a so-called moonlight picture.

The writer obtained a very pretty picture showing a moon-

light effect, by photographing a walk, lined on either side with young trees just budding; the sun was low, and to the left of the camera, casting long heavy shadows directly across the path; the exposure was short; the development rapid; the shadows and dark portions of the trees printed deep, thus making a pleasing effect.

Louis Clarence Bennett.

TWO EIKONOGEN FORMULÆ.

A number of experiments with eikonogen, have been tried by Mr. Louis Clarence Bennett and myself resulting in the following formulæ.

A.

Water	6 oz.
Sulphite Soda, crys	480 grains

DEVELOPER.

Water	3 oz.
A	1 oz.
Eikonogen (powdered)	6 grs.

If a stock developer of one solution is required use the following:

Water	9 oz.
Sulphite Soda, crys	480 grs.
Eikonogen (powdered)	96 grs.
Alcohol	1 oz.

It will be discovered that the sulphite soda furnishes all the alkali required, also as in the first formula $1\frac{1}{2}$ grains of eikonogen to the ounce of developer is sufficient and gives fine portrait negatives. The second formula reduced with equal volumes of water makes fine lantern slides.

Henry Clay Price.

ON DETERMINING THE SENSITIVENESS OF PHOTOGRAPHIC PLATES BY MEANS OF THE SPECTROGRAPH.

As LONG as photographers exclusively employ collodion or gelatine plates, sensitive only for blue and indigo and, to a limited degree, to the ultra-violet rays, their relative sensitiveness can only be found by a series of objective exposures, or by means of any of the sensitometers proposed for practical use during the last decade. None of these instruments has become so popular as that constructed by Warnerke, and many plate manufacturers state with its aid the numerical sensitiveness of

their wares. Notwithstanding the limited efficacy of the instrument, and the want of reliability of its luminous plate, practice has proved it to be not deceptive enough to lead to entirely useless results. This refers, of course, to the ordinary plate only.

Of late, however, when the relations of absolute sensitiveness have been entirely changed by the introduction of orthochromatic methods, the advantages offered by the Warnerke sensitometer have become seriously sceptical, not only in abstract scientific examination but also to a very great extent in practical working. The reason of that is simply an insufficiency of light rays radiating from its phosphorescent plate. It is of a light blue color and homogeneous, to all appearances; any other rays I have not yet been able to detect. To be fully convinced of this fact I have adopted a method of investigation, much safer unquestionably than any other heretofore proposed. After making the plate luminous in the ordinary manner it is covered with a card, in the centre of which is cut a slit of 2x30 m.m. dimensions. The rays passing through it, when examined by means of a prism, show the whole spectrum to consist of a single band only, equal in color as well as width to the luminous slit, as far at least as ocular observation goes, but neither yellow nor red is perceptible. No other light but blue is radiated from the luminous plate, not perfect blue, however, it is of distinct tone. Supposing, then, a photographic plate, not at all sensitive for this particular ray, were examined with the Warnerke sensitometer, the test for sensitiveness, can result only in total failure, because the plate might possibly be highly sensitive for rays other than those radiated from the luminous substance.

Similar facts will be found to exist with all orthochromatic plates. They all are sensitive for blue, but likewise so for yellow and red, according to the sensitizer they contain. As far as the least refrangible light rays are concerned, the Warnerke sensitometer cannot be depended upon, and the results obtained with orthochromatic plates are totally unreliable. If those highly sensitive plates should be generally adopted for practical work, of which not the least doubt can exist, the days of Warnerke's instrument are numbered.

The description of other sensitometers may be well omitted; they all have been superseded by the reliable spectrograph, by the aid of which more distinct information on the sensitiveness of photographic plates is obtained. Whoever desires to learn of their relations to the action of light rays of different colors

should resort to the spectrograph. Heavy flint glass, like that of the Amici prisms, should, however, be entirely excluded from the instrument; these glasses are impenetrable to ultraviolet. Violet even, and not less indigo and blue, are held back with much energy, while the luminous rays, yellow and red, are allowed to pass through freely without any hindrance almost. Such prisms must naturally lead to erroneous sensitometer numbers. On account of partial absorption yellow is reproduced with excessive force, and plates found to be highly sensitive for yellow and red in the spectroscope will fail to show the same properties with objective exposures.*

Lenses and prisms made of crown glass or of light flint with less dispersive power are preferable for ordinary purposes. With any camera and without much trouble a suitable spectrograph may be easily constructed. To obtain faultless spectrum photographs a scrupulously correct instrument is not necessary. I have made sharpest pictures with precision instruments as well as with apparatus but roughly built, and even professional spectroscopists have made the most astounding discoveries with improvised instruments.

To find the behavior of plates towards any light source, a series of spectra, with regularly increasing time of exposure, should be photographed, the plates dried, and be examined in regard to the time required to produce a developable impression by different colors. The different sensitiveness will then

* To understand clearly the great influence of partial absorption produced by Amici prisms compare my spectrograms of erythrosine silver (David & C. Scolik: Die orthoskiagraphishe Photographie. Knapp. Halle a/S. 1890.) with those of Vogel's iodo-eosine silver plates (his Handbuch der Photographie, 4th Ed., 1890). Both photographs illustrate the sensitizing action of one and the same dye, for erythrosine is identical with iodo eosine. Vogel made his spectrum photographs with a spectrograph furnished with an Amici prism; mine were made with the large Quartz spectrograph. Vogel's prism has swallowed up the ultraviolet so completely that not a trace of it is discernible; and how much the action of indigo and blue has been suppressed may be judged of the high intensity of the maximum in yellow, according to Vogel's own calculation of six and even ten times force, and as impenetrable as the blue maximum.

No erythrosine plate has this enormous sensitiveness for yellow. unless it be exposed under abnormal conditions. But when color-sensitive plates are exposed in the gloom of an Amici prism, and the sombre light filtered through the terrestrial atmosphere, and when the sun is at its lowest altitude (the first days of January). it is quite easy to demonstrate at ocular a high sensitiveness for yellow, that under no other conditions is possible to attain. Furthermore are the ideas of intensity and sensitiveness sadly confused, ostensibly with a purpose—that of shedding lustre upon the eoside-silver plate for a long time to come.

Of quite a different character are my erythrosine silver spectrograms. They are distinguished by powerful action in ultraviolet. an intense violet and a vigorous blue. Astonishing is the much lower yellow sensitiveness of my plates when compared with the action of blue on the one side and with the Vogel spectra on the other. Had I placed before the slit of my instrument a heavy flint. like an Amici prism, and had I exposed my plates when the sun stands low, when the refrangible rays of the spectrum half act with little energy, my spectrograms would have been equal to Dr Vogel's. But I preferred to show how erythrosine silver behaves under normal conditions. Errors in the photographing of my spectra, and upon which the difference of time and Dr. Vogel's might be based, are improbable. Researches made at other times and occasions have invariably led to the same results.

be found to be reversely proportioned to the time of exposure. Were we, for example, to inquire, how the sensitiveness of a Vogel eoside of silver plate (manufactured by Perntz, of Munich), is proportioned to our own instrument, the *first spectrum of the series to be photographed should be exposed for a time too short to produce a developable impression.* Subsequent and longer exposure, will then generally produce an image of extremely feeble character—a mere breath upon the plate. The thinner the picture of the spectrum, and the clearer ground of the plates, the more reliable is the sensitometer number derived from the series of spectrograms made by increasing time of exposure. As long as sensitiveness alone is the object of inquiry, the intensity of the plate is of no importance whatever. *It is totally wrong to determine numerical value of light-sensitive films by the density of the negative.* Sensitiveness and intensity are two entirely different things, as every photographer knows who understands the use of the sensitometer. How little hold is offered by the intensity of the plate, when inquiring into its sensitiveness, is proved by the fact that the two go never hand in hand. Some plates resist strenuously the action of certain rays before decomposition of the light-sensitive components takes place; but when their stability has yielded at all to the force of the developer the intensity of the negative increases with much rapidity. Density builds up easily when the exposure has been longer than required for the production of the breath-like picture; not proportionately, however, but progressively. This phenomenon occurs with Vogel's eosine plates to an unusual extent. A hundred times have I had opportunity to observe these properties when associated with Dr. Zettnow, of Berlin, and to whom we are indebted for the most important researches of erythrosine plates, to examine extensive series of orthochromatic plates. Other phenomena occurring and observed by studious investigators may be well explained by this progressive increase of density, preëminently among them two peculiarities—the very changeable intensity of the maximum in yellow, and different yellow action even under strictly normal conditions.

Whoever wishes, with the foregoing explanation on hand, to determine the yellow and blue sensitiveness of erythrosine plates, will find that the former never reaches the height, numerically, stated by Dr. Vogel, when the exposure is made by high altitude of the sun. Far from midday, or in wintertime, the proportion of brightness in the sun spectrum is

entirely changed. The general sensitiveness of the plate advances then more and more towards the red end of the spectrum. When the sun stands low, at its rise and set, the erythrosine silver plate may triumph to a still greater extent, for then it is nearly exclusively sensitive for yellow and red, but for no other rays.

Victor Schumann.

AN APPARATUS FOR PHOTO-MICROGRAPHY.

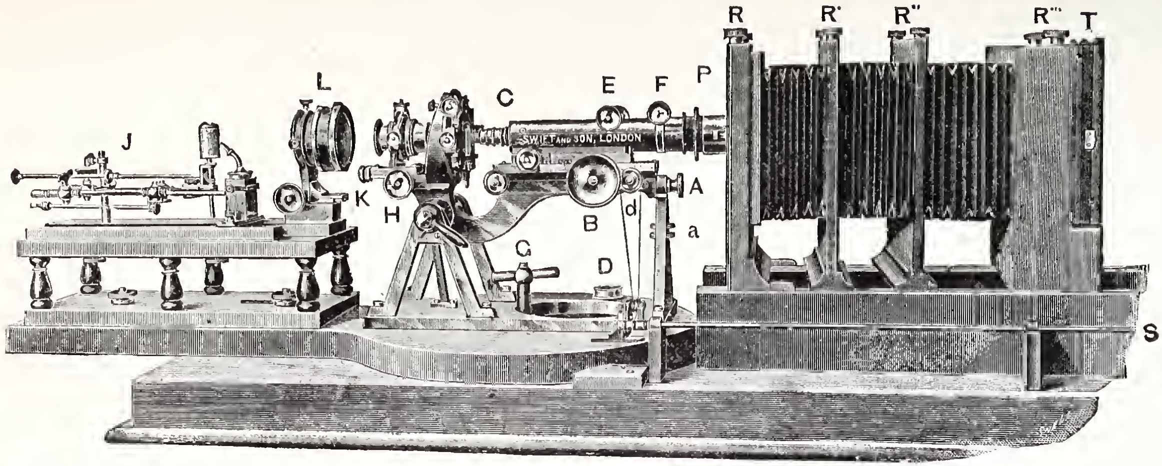
The apparatus figured here was designed in its most prominent features by me, while the details were carried out and the work performed in the most satisfactory way by Messrs. Swift and Son, of London. As this instrument evoked a considerable amount of favorable comment in England, a description of it may be of some interest to readers of the Annual in America.

The instrument was, of course, somewhat, though not by any means startlingly, expensive, but fresh drawings had to be made for every detail, the amount of metal is considerable, and the workmanship is of the most accurate description. There are over 700 separate pieces of metal in the microscope alone, so at least I am informed. The features which I believe to be newest in microscopic construction and most important towards the ends kept in view—absolute steadiness and perfect accuracy—are: (1) the collimating arrangement at A and *a*; (2) the clamping of the whole microscope and radiant-apparatus to the chief base board by the clamp-screw at g; (3) the system of pulleys actuating the feed adjustment; (4) the long "body" on which the "tube" is supported.

The microscope and the radiant are fixed to one base board, which can be turned outwards from the "working" axis for examination of the object and adjustment of the critical optical parts, such as the tube-length or "collar correction," the centering and focusing of the condenser, etc.

The parts bearing the radiant—in this case a lime-jet—are movable, within ample limits, in any direction.

The "bull's-eye" is of unusually short focal length for its dimensions. The substage has both coarse aud fine adjustments, and the stage has every motion consistent with perfect accuracy of movement. The fine adjustment of the microscope is performed by means of a very long lever arrangement; this part is entirely the design of Mr. Swift.



REFERENCES TO FIGURE.—A. A removable screw. *a*. Screw and collar of collimating arrangement. B. Coarse adjustment. C. Placed over fine adjustment. D. Placed over (1.) A pulley by rubber on focusing rod S. (2.) A pair of small pulleys loose on their axle and sprung slightly downward so as to keep the cord taut. *d*. Pulley on stand. To the left and close to the stage is the other pulley. A cord passes from *d* round the other pulley, taking a turn round the fine adjustment screw (below C). E. Actuating draw-tube. F. Clamp on draw-tube. G. Clamps the whole table, bearing microscope and illuminating gear to the chief base. H. Coarse adjustment of substage. K. Fine adjustment of substage. J. Oxyhydrogen jet—"mixing" with "cut-off" (Newton.) L. (1.) Bull's-eye. (2.) Cell for water or colored liquid or glass "screen." P. Cap fitting over ocular end of tube. P. works by a stud in a spiral slot and has centering arrangement not shown. R. R.' R.'' R.''' Clamping parts of camera to base-board. T. Back of camera, has slight traverse-movement. S. Focusing rod.

The instrument now forms part of the outfit of the Rogers Veterinary College, and is to be worked by Mr. P. D. Caghill, who is well qualified not only to use it to best advantage, but to improve it in detail if such improvement is needed. I need hardly say that every care has been taken to provide a stand of unimpeachable solidity for the apparatus, and we may expect to see most valuable additions to photo-micrographic achievements produced by means of this carefully planned instrument.

The figure with references will, I hope, explain itself to those who are acquainted with photo-micrographic work.

Andrew Pringle.

A REVIEW OF THE YEAR.

After our readers have carefully read the articles contributed to this issue of the American Annual of Photography by eminent scientists and practical photographic authors, and compared the accomplishments of the preceding twelve months, with those of previous years, it will become evident to them that the year 1890 A. D. stands foremost in photo-chemistry and photographic practice, although little distinctly new has been discovered, and little more than ordinary innovations have been brought forward during that period. Nevertheless, the science of photography during the last years has attained most wonderful perfection, and has produced results of great importance in abstract science and in practical work.

The office of the professional photographer is principally to copy from nature the form and features of our loved ones, the accomplishment of which will always be desired as long as affection exists. The professional photographer has taken the suggestions of the experimenting and investigating amateurs to amplify his knowledge, and has made practical their suggestions. Eminent successes have been the result of the coalition. For artistic accomplishments and practical knowledge the American professional photographer now stands high among his compeers, and his productions occupy an eminent place among those of other countries, where the education of the photographer is assisted and fostered by governmental aid, in educational institutions, and by eminent professors and demonstrators.

England and France, to some extent, but more prominently, Germany, Austria, and Switzerland, understand the necessity of educating the young in the theory and practice of photography, and many industrious and diligent students have already returned to our shores from those institutions. In this country educational matters have not been as well taken care of as the importance of the subject and the general desire to study warrant. It is true schools of photography have been connected with institutions of learning, but they are few in number. There is but one School of Photography in this country worthy of the name, rivaling other similar establishments in the Old World. The School of Photography connected with the Chautauqua University and known as the Chautauqua School of Photography has instructed five hundred students during the short term of its existence, and has three branches perfectly organized and equipped. The Corresponding Classes, the Classes for Practice at the School Head-quarters, and the Summer School at Chautauqua.

Photographic literature has nowhere a better example of progress than in the 1890 edition of the PHOTOGRAPHIC TIMES AMERICAN ANNUAL, of which 15,000 copies were published and circulated. In our own country, as well as in the British Empire, and other European States, periodicals have increased in numbers, and in intrinsic value, and many books on the theory and practice, and on special points have been published in various languages.

The most notable improvements made in practical photography are those with reducing agents employed for developing purposes. Of those isomeric with other well tried agents, of various naphthaline derivatives, and similar organic bodies, none has attracted so much attention as the eikonogen, proposed not more than a year since by Dr. Schleussner, of Frankfort-on-Main. In its compositions, employed in great variety, the substance has displayed energy hardly conjectured by any practical photographer heretofore. Not only in negative processes, but also for positive work on glass or paper support, it has been extensively used. Since its advent, other and similar bodies have been proposed for like purposes, but without satisfactory results. Whether the production of absolutely transparent and opaque negatives, as used in mechanical printing processes, will find an equally satisfactory factor in eikonogen, is probably a question of time only, as long, at least, as the gelatine emulsion plate has not yet superseded the wet collodion plate for that class of work; still the experiments made

in this country and in Europe, and those of Col. Waterhouse, with eikonogen in combination with phenyl-thio-carbamide, are as encouraging as they are interesting, not only as a source to obtain impressions of absolute density, but principally so on account of the reversal of the photographic image.

Orthochromatic methods have become more popular than ever among American photographers. Reproduction establishments and landscapes photographers now use principally color sensitive plates prepared with erythrosine, cyanine and similar dyes.

In photo-chemical printing nothing new of much importance has been brought forward. The albumenized paper has held its own notwithstanding the many innovations appearing every now and then at almost regular intervals. Platinum has become so enormously high in price than even could we obtain regularly a well working commercial paper, prepared with this substance, it would be almost too costly for professional work. Chloride of silver collodion paper, notwithstanding its excellent qualities seems not to meet with deserved success in this country, but an analogous gelatine paper has made rapid strides forward and become popular in all photographic circles. If there is any probability of albumen paper being superseded, the printing-out chloride of silver gelatine paper is likely to be the one to take precedence. Printing on developable paper has been thoroughly established for certain purposes, and the process is practiced extensively. In blue paper printing no improvements have been made; but a new process with primuline, proposed by Green, of England, is attracting attention, as it promises to be a substitute of unusual merits to all copying (lichtpaus) methods, and of great bearing upon all photo-chemical printing.

Photo-mechanical printing has attained to a high standard in America. In high relief printing, whether by the wash-out gelatine process, but little practiced now, or by zincographic plates, almost universally adopted, we have produced marvellous results, especially are those in half tones made by Kurtz, Levy, and others, worthy of being acknowledged. In connection with this it should be mentioned that we now produce excellent screens for that class of work. Photogravure, or entaglio printing from copper plates constantly makes improvements, while in heliochromic printing Lichtdruck, Bierstadt, and Ives have invented new methods and produced excellent results.

Bearing upon ornamental or decorative industry there is probably no process of such high importance as that of Dr. A. Miller Jacobus, who etches upon glass in high and low relief through a film of metallic resinates which resist the action of hydrofluoric acid.

In photo-micrography and the art of projection, much has been done on both sides of the Atlantic, and in both of these branches of photography American efforts have earned universal acknowledgement.

Celestial and spectrum photography has naturally been confined to a few scientific men in institutions, such as the Harvard University and the Lick University on Mt. Hamilton, of which we are justly proud.

In studio work as well as in landscape and genre photography artistic skill is increasing. Artificial light is now more frequently employed than ever before. For reproduction work the electric arc light serves well wherever installed, and a variety of magnesium flash-light lamps assist the portraitist in doing excellent work.

For the construction of objectives the Jena glass is now preferred by all opticians, and Americans have constructed lenses of the highest merit, equalling if not excelling the productions of other countries.

Apparatus and utensils manufactured in America for the photographer's use, exceed in quantity and quality all that comes to us from abroad.

Among the hand cameras which are now so popular there is none so light and compact as the Triad camera, manufactured by the American Optical Company, which is adapted for and fitted with roll-holder, glass plate holder, and cut film holders. The name itself of the camera indicates its threefold purpose.

The "Irving" View camera is the most popular of all tripod cameras introduced this year, because it so compact when folded and all unnecessary brass work is omitted.

Death has entered the ranks of scientific and practical photographers as usual during the past year, and has removed from a useful work such eminent men as the genial A. von Melingo and the learned E. Hornig; the pioneers, Fred. Graff and J. B. Gardener; Major O. Michaelis, the electrician; the two Scherings, well known as manufacturing chemists, and others of our co-laborers and friends who will not soon be forgotten.

Charles Ehrmann.

AMERICAN PHOTOGRAPHIC SOCIETIES.

NOTE.—The Societies thus marked (*) have not replied to requests for information, and are repeated same as last year.

Agassiz Association, Manhattan Chapter, N. Y. (Photographic Section).—*President*, William T. Demarest; *Board of Trustees*—William T. Demarest, W. S. Miller, C. F. Groth, F. Kromur, O. H. Lee, E. B. Miller, F. Schneider, J. Beuermann, H. Rowley; *Treasurer*, Wm. S. Miller; *Librarian*, D. Hajek: *Corresponding Secretary*, E. B. Miller, 141 East 40th Street, New York City. Place of meeting, announced. Regular meetings, first Friday after first Monday each month, 8 P.M. Annual meeting, first regular meeting of year. Membership, May 1, 1890: Honorary, 2; active, 55.

Albany Camera Club, The—Albany, N. Y., 20 North Pearl Street. Organized October 21, 1887. *President*, W. W. Byington; *Executive Committee*—The officers of the club; *Treasurer and Secretary*, Charles L. Palmer, 20 North Pearl Street, Albany, N. Y. Place of meeting, Club Rooms, 20 North Pearl Street. Ordinary meetings, first Friday in each month, at 8 P.M. Special meetings at call of President. Annual meeting first Friday in November of each year. Membership September 1: Active, 26. Total, 26—limit, 40.

Amateur Photograpers' Association of Watertown, N. Y.—Organized, January, 1889. *President*, A. R. Wilson; *Vice-President*, T. E. Knowlton; *Executive Committee*, T. E. Knowlton, Geo. J. Woolley, L. G. Childs; *Treasurer*, C. G. Lewis; *Librarian and Secretary*, Geo. J. Woolley, 17 Mullin Street. Place of meeting, 17 Washington Street, A. R. Wilson's. Ordinary meetings, first Tuesday of each month. Special meetings at any time called for. Annual meeting, first Tuesday in February. Membership, September 1: Honorary, 1; active, 8. Total, 9.

Amateur Photographic Society of Baltimore, Md.—*President*, Isaac T. Norris; *Vice-President*, Henry Lauts; *Executive Committee*, C. D. Cugle, W. C. Farber, Henry Lauts, Daniel Miller, C. W. Newton. *House Committee*, A. S. Murray, Harry D. Williar, Jas. S. Cummins, I. T. Norris; *Treasurer*, Burton G. Buck; *Librarian*, Frank N. Clotworthy; *Corresponding Secretary*, Harry D. Williar, No. 9 East Camden Street. *Recording Secretary*, Wm. P. Hall. Place of meeting, No. 106 North Charles Street. Ordinary meetings, every Friday at 8 P.M. Special meetings, third Friday each month. Annual meeting, third Friday in April. Membership September 1: Honorary, 3; active, 51; Ladies, 7; Corresponding, 3. Total, 64.

Amateur Photographic Association, Selma, Ala.—(Late Y. M. C. A. Camera Club). Re-organized April 16th 1890. *President*, Watkins Vaughan; *Executive Committee*, J. B. Johnson, W. S. Monk, H. V. Bachelder; *Librarian*, Mrs. J. B. Johnson; *Secretary* and *Treasurer*, S. Orlando Trippe, Selma, Dallas Co., Ala. Place of meeting Johnsons studio, Broad Street. Ordinary meetings, first Wednesday each month. Special meetings, call of President, 8 o'clock p.m. Annual meeting, January 1st. Membership September 1: Active, 18.

American Institute, N. Y. (Photographic Section).— Organized March 26, 1859. *President*, Henry J. Newton; *Vice-President*, Cornelius

Van Brunt; *Treasurer*, Edward Schell; *Secretary*, Oscar G. Mason, Photographic Department, Bellevue Hospital, N. Y. City. Place of Meeting, Institute Hall, 115 West 38th Street, N. Y. City. Ordinary Meetings first Tuesday of each month, except July and August, at 8 o'clock, P. M. Special Meetings on call of officers. Annual Meeting first Thursday in February at 8 o'clock, P. M.

American Lantern Slide Interchange.—Organized, 1888. *Manager*, George Bullock, Oak Ave., Cincinnati, Ohio; *Assistant Manager*, Wm. H. Rau, Philadelphia, Pa., F. C. Beach, 361 Broadway, N. Y. *Directors*, F. C. Beach for the Society of Amateur Photographer of New York, W. H. Rau for the Photographic Society of Philadelphia, Pa., C. G. Hine for the Newark Camera Club, W. S. Bell for the Pittsburg Amateur Photographer's Society; George Bullock, for the Cincinnati Camera Club; W. A. Peaslee, for the Louisville Camera Club; L. E. Bowman for the New Orleans Camera Club; H. B. Alexander, for the St. Louis Camera Club; W. A. Morse, for the Chicago Lanterns Slide Club; A. S. Murray, for the Amateur Photographic Society of Baltimore; E. L. Woods, for the Pacific Coast Amateur Photographic Association; Charles C. Hinchman, for the Detroit (Mich.) Camera Club. Interchanges of slides are carried on annually with three foreign societies. Slides are interchanged every month between the associated societies except during July and August. Each yearly interchange begins on December 1st. Slides are inspected by the managers between November 15th and December 1st of each year.

Association of German Photographers, (New York.)—Organized March 1868. *President*, A. Mildenberger, *Vice-President*, Karl Kutscher. *Treasurer*, S. L. Pellnitz, *Librarian*, L. Burghard, *Secretary*, L. Schmid, German Photo. Association, 62 E. 4th Street, New York City. Place of meeting, 62 East 4th Street. Ordinary meetings second and fourth Wednesday of every month. Annual meeting, second Wednesday in March. Membership September 1: Honorary, 4; active, 30. Total, 34.

Atlanta Camera Club.—Organized October 1888. *President*, F. J. Paxon. *Vice-President*, C. H. Behre, M. D. *Treasurer*, F. O. Stockton, M. D. *Secretary*, vacant at present. Place of meeting, 66½ Whitehall Street. Ordinary meetings second Monday of each month. Annual Meeting, October 1889. Membership September 1: Honorary, 1; active, 18. Total, 19.

Boston Camera Club.—50 Bromfield Street, Boston, Mass. Organized 1882. *President*, Henry N. Sweet; *Vice-President*, Francis Blake, Auburndale, Mass.; *Executive Committee*—Henry N. Sweet, Francis Blake, Edw. F. Wilder, F. Alcott Pratt, John C. Lee, R. A. Bullock, C. H. Currin, C. E. Davis, Jr., J. G. Hubbard, S. Henry Hooper, O. A. Eames: *Treasurer*, F. Alcott Pratt, 3 Somerset Street, Boston: *Librarian*, John C. Lee, Brookline; *Secretary*, Edward F. Wilder, 47 Tremont Street, Boston. Place of meeting, Club Rooms, 50 Bromfield Street, Boston. Ordinary meetings, first Mondays of each month except July, August, and September. Annual meeting, first Monday in January. Membership May 1: Honorary, 2; active, 119; associate, 5. Total, 126. Exhibitions monthly of members' work, and triennially in connection with New York and Philadelphia.

Brooklyn Academy of Photography.—Brooklyn. Rooms in the Hoagland Laboratory, Henry and Pacific Streets. Incorporated February, 1887. *President* Frank La Manna; *Vice-Presidents*, First,

W. T. Wintringham; Second, Wm. Arnold; Third, John Merritt, M.D.; *Council*, J. Merritt, M.D., Gonzalo Poey, R. N. Denison, M.D., George S. Wheeler, T. B. Mills, Harold Bunker; *Treasurer*, Edward H. Quantin; *Librarian and Curator*, George S. Wheeler; *Secretaries*, Hermance Temper, 54 Park Place, Brooklyn; Harry S. Fowler, 24 State Street, New York. Place of Meeting, Hoagland Laboratory, Henry and Pacific Streets. Regular Technical Meetings second Wednesday of each month. Exhibition Meetings monthly, or as often as interesting views shall be prepared. Annual Meeting about second Wednesday in February. Membership September 1: Resident active, 90; Corresponding, 20; Total, 110.

* **Brooklyn Academy of Science (Photographic Section).**—Organized March 26, 1888. *Secretary*, J. W. Holbrook, Jr., 462 Hart Street, Brooklyn, N. Y.

Brooklyn Institute (Department of Photography).—200 Washington Street, Brooklyn, N. Y. Organized March 26th, 1889. *President*, Alexander Black; *Vice-President*, H. D. Eggleston; *Executive Committee*—Alexander Black, John H. Dingman, Lewis E. Meeker M.D., Gould W. Hart, Prof. Wm. C. Peckham, H. D. Eggleston, Edmund Blunt, George H. Cook, F. A. Hetherington, C. H. Ashbury; *Treasurer*, William C. Bryant; *Librarian*, Lewis E. Meeker; *Secretary*, Gould W. Hart. Place of meeting, Brooklyn Institute. Ordinary meetings, second Tuesday of each month, at 8 P.M. Special meetings on Friday evenings at 8 P.M. Field meetings on Saturday afternoons. Annual meeting second Tuesday in May. Membership September 1: Active, 120. Total, 120. One exhibition in the autumn of each year.

Brooklyn Society of Amateur Photographers, The.—412 Jay Street, Corner Fulton Street. Organized March, 1889. *President*, Mr. C. M. Trowbridge; *Vice-President*. Mr. Homer Ladd; *Executive Committee*, Messrs. C. M. Trowbridge, H. Ladd, H. P. Sewall and E. D. Litchfield; *Treasurer*, Mr. E. D. Litchfield; *Librarian*, Mr. G. R. Sheldon, Jr., 57 Clark Street; *Secretary*, Mr. H. P. Sewall, 65 Pineapple Street, Brooklyn, N. Y.

Buffalo Camera Club.—306 Main Street, Buffalo, N. Y. Organized October 10, 1888. *President*, Dr. G. F. Hunter; *Vice-President*, Charles W. Hamlin; *Board of Directors*, Dr. Hunter Bartlett, C. W. Hamlin, C. E. Hayes, G. J. Bailey, E. F. Hall, Dr. Bernard Bartow, Thomas Cary Welch, E. L. Burdick, G. R. Howard; (Three Committees of Board of Directors—Entertainments, Rooms, Library); *Treasurer*, Charles E. Hayes; *Recording Secretary*, George J. Bailey; *Corresponding Secretary*, E. F. Hall, 306 Main Street, Buffalo, N. Y. Place of Meeting, 206 Main Street. Ordinary Meetings, second Tuesday in each month, at 8 o'clock, P. M. Lantern Slide Exhibitions, latter part of each month, at 8 o'clock, P. M. Annual Meeting, first Wednesday in October. Membership September 1: Active, 42; total, 42.

* **Cambridge Camera Club.**—Cambridgeport, Mass. *President*, J. A. Darling; *Treasurer*, C. W. Wilson; *Secretary*, H. Sumner Yates. Place of meeting, 23 William Street. Meetings, first Tuesday in the month.

Camera Club of Hartford, The.—Organized 1885. *President*, Dr. George L. Parmele; *Executive Committee*, Dr. Geo. L. Parmele, Edward H. Crowell, Chas. R. Mason, Elmer M White, Albert H. Pitkin, J. C. Hills, Robt. W. Curtis; *Treasurer and Corresponding Secretary*, Edward H. Crowel, P. O. Box 480, Hartford. *Recording Secretary*,

Chas. R. Mason. Place of meeting room 61 Ætna Life Ins. Co's building. Ordinary meetings second Tuesday in each month at 7.30 p.m. Special meetings whenever called by the President at the written request of five members. Annual meeting second Tuesday in February. Membership September 1, Active, 63. Total 63. Exhibitions in the fall.

Camera Club of Rochester, N. Y. The.—Organized 1888. *President*, G. Hanmer Croughton. *Vice-President*, G. W. Turner, 1st, Samuel H. Lowe, 2nd. *Board of Directors*, G. H. Croughton, J. Louis Willard, W. G. Mitchell, Ed. Horne, Geo. W. Haskins, W. Page, Willis Gode, *Treasurer*, W. G. Mitchell. *Secretary*, J, Louis Willard, Court Street, Rochester, N. Y. Place of meeting 62 State Street. Business meetings the 1st and 3rd Friday in each month. Social meeting every alternate Friday. Annual meeting 1st Friday in Januaay. Membership September 1: Active 60.

"Camerads."—New Brunswick, N. J. Organized February, 1889. *President*, Prof. P. T. Austin ; *Vice-President*, W. D. Horn ; *Treasurer*, Charles V. Myers ; *Secretary*, Dr. Harvey Iredell. Place of meeting, New Jersey Hall. Ordinary meetings, fourth Thursday in each month at 8 o'clock P. M. Special meeting, when case may demand. Annual meeting, February. Membership September 1 : Active, 51.

Canada Photographic Association.—Organized January, 1884. *President*, C. S. Cochran, Hamilton, Ont.; *Vice-Presidents*, F. Cooper, London, J. C. Walker, Brantford ; W. D. Edy, London ; *Executive Committee*, President, Vice-President and Secretary-Treasurer ; *Secretary* and *Treasurer*, E. Poole, St. Catharine's, Ont. Place of meeting, 1,891 Hamilton. Annual meeting, summer.

Case School Camera Club.—Organized, 1888. *President*, Wm. T. Rynard ; *Vice-President*, Geo. D. Marshall ; *Treasurer* and *Secretary*, Edw. H. Williams ; *Corresponding Secretary*, Milton B. Punnett, Case School of Applied Science, Cleveland, Ohio. Place of meeting, C. S. of A. S.

Chautauqua Photographic Exchange Club.—Organized August, 1888. *President*, Prof. Charles Ehrmann ; *Secretary and Treasurer*, Miss Ella Switzer, Philipsburg, Centre County, Pa.; *Assistant Secretary*, Mrs. Laura H. Mull. Annual meeting and exhibition, Chautauqua Assembly Grounds. Membership, September 1 : 34.

Chicago Camera Club, The.—182–184 Wabash Avenue, Chicago, Ill. Organized May, 1889. *President*, Rev. M. L. Williston ; *First Vice-President*, Wm. H. Shuey ; *Second Vice-President*, Mrs. A. C. McClurg ; *Executive Committee*, F. K. Morrill, J. W. Buehler, W. H. Shuey, W. B. E. Shufeldt, Mrs. John Leeming ; *Treasurer*, John W. Buehler ; *Librarian*, Mrs. John Leeming ; *Secretary*, Fred. K. Morrill, 182 Wabash Avenue, Chicago. Place of meeting, 182 Wabash Avenue. Ordinary meetings, second Tuesday evening of each month, 8 o'clock. Special meetings, subject to call. Annual meeting, May. Membership, September 1 : Honorary, 9 ; active, 117 ; associate, 13. Total, 139. Club rooms open each day from 9 A. M. to 6 P. M. Visitors and members of other camera clubs always welcome.

Chicago Lantern Slide Club, The—Stewart Building, State and Washington Streets. Organized October, 1886. *President*, Col. A. F. Stevenson, 95 Clark Street ; *Executive Committee*, Officers of the Club ; *Treasurer*, E. J. Wagner, Michigan Avenue and 12th Street ;

Secretary, W. A. Morse, 20 Kemper Place. Place of meeting, as above stated. Ordinary meetings, Third Thursday in each month. Special meetings, whenever called. Annual meeting, regular December meeting. Membership, September 1: Honorary, 3; Active, 55.

* **Chicago, (Ill.), Photographic Society of**—*President*, Judge J. B. Bradwell; *Executive Committee*, F. A. Place, M. J. Steffins, H. D. Garrison, M.D.; *Treasurer*, G. A. Douglass; *Secretary*, C. Gentilé, 134 Van Buren Street. Place of meeting, Art Institute. Meeting, first Tuesday in each month.

Cleveland Camera Club.—Organized January 25, 1887. *President*, Montague Rodgers, 52 Public Sq.; *Vice-President*, F. J. Dorn, 151 Scoville Ave.: *Executive Committee*, F. J. Dorn, W. F. Dorn, J. A. Duncan, A. Ogier, F. Ogier and J. Di Nunzio; *Treasurer*, W. F. Dorn, 417 Woodland Ave.; *Receiving Secretary*, Dr. R. Dayton, No. 5 Euclid Ave., Cleveland, O.: *Corresponding Secretary*, A. C. Ogier, 239 Case Ave. Cleveland, O. Place of meeting, No. 5. Euclid Ave. Ordinary meetings, first and third Tuesday in the month, at 8 o'clock. Special meetings, for Field Day and such work, no fixed day. Membership September 1: Honorary, 5; Active, 22. Total 27.

Columbia College Amateur Photographic Society.—Columbia College, New York City. Organized 1884. *President*, Julien T. Davies, Jr.; *Treasurer*, Henry R. Taylor; *Secretary*, Dwight W. Taylor, Columbia College, New York City. Place of meeting, Columbia College, Ordinary meetings, first and third Friday of each month during College term. Membership September 1: Honorary, 27; Active, 28. Total, 25.

* **Columbian College Camera Club.**—Washington, D. C. Organized 1888. *President*, Allan J. Houghton; *Vice-President*, Edwin W. Ashford; *Treasurer*, A. J. Houghton; *Librarian*, W. B. Asmussen; *Secretary*, Chas. P. Spooner. Place of meeting, Columbia College, Washington, D. C. Ordinary meetings, every Wednesday afternoon.

Columbus Camera Club.—*President*, Frank Henry Howe, *Vice-President*, Joseph N. Bradford; *Executive Committee*, Frank Henry Howe, J. C. Hull, J. N. Bradford, F. J. Combs, G.Y. Anderson; *Treasurer*, Joseph P. Hull; *Secretary*, G. Y. Anderson, P. O. Box 64, Columbus, Ohio. Place of meeting Room 10, Dunn building. Ordinary meetings third Thursday in each month at 7.30 p. m. Special meetings at written request of two members. Annual meeting, 3rd Thursday in December. Membership September 1: Honorary, 3; active, 29. Total, 31.

Cornell Camera Club.—*President*, Wm. B. Hand; *Vice-President*, Lehman Levy; *Secretary*, James F. Barker; *Treasurer*, John H. Van Buskirk. Place of Meetings, Physical Lecture-room, Campus. Meetings held every third Friday evening, beginning with the second Friday in each term of the Academic year.

Cranford Camera Club.—Cranford, Union Co., N. J. Organized September 13, 1888. *President*, William Chamberlain; *Treasurer*, J. P. M. Joseph; *Secretary*, A. H. Plummer, Cranford, Union Co., N. J. Place of meeting, Eastman Street, Cranford, N. J. Ordinary meetings every Saturday evening, 8 o'clock. Membership September 1: Honorary, 1; active, 8; corresponding, 2. Total, 11. Exhibitions, 1 annually, in the Fall.

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VACHT "VOLUNTEER."

* **Grand Rapids Amateur Photographic Club.**—Grand Rapids, Mich. *President*, Dr. J. C. Parker; *Executive Committee*, Dr. J. C. Parker, Ralph Tietsort, J. B. Barlow; *Treasurer*, Ralph Tietsort; *Librarian*, N. Fred Avery: *Secretary*, J. B. Barlow, Grand Rapids, Mich. Place of meeting, 15 Fountain Street. Ordinary meetings, first and third Mondays in the month, 7.30 P. M. Annual meeting, first Monday in May. Membership September 1st: Active 11: total, 11.

Hoboken Camera Club.—140 Washington Street, Hoboken, N. J. Organized March 22, 1889. *President*, A. J. Thomas; *Vice-President*, F. A. Muench; *Board of Trustees*, A. Beyer, G. E. Mott, E. Gritten, President and Vice-President included; *Treasurer*, C. L. A. Beckers; *Custodian*, A. C. Ruprecht; *Secretary*, George H. Steljes, 140 Washington Street, care of Camera Club. Place of Meeting at the Rooms, 140 Washington Street. Ordinary Meetings first and third Tuesdays of each month, at 8 o'clock, P. M. Special Meetings second and fourth Tuesdays. Membership up to date: Honorary 5; active, 34; total, 39. Publications, *Hoboken Camera Club Journal*, composed by the members. Exhibitions not yet acted upon.

Indianapolis Camera Club.—Organized November 18, 1887. *President*. Chas. McBride; *Vice-President*, H. C. Chandler; *Executive Committee*. John T. Harris, Rembrandt Steele, Henry Kotche; *Treasurer*, Carl H. Lieber, 33 South Meridian Street. Place of meeting, various. Ordinary meetings, 1st Tuesday in month. Special meetings on call of Executive Committee. Annual meeting, November. Membership September 1: Honorary, 1; active, 35. Total, 36.

Louisville Camera Club, The—Louisville, Ky. Organized April 24th, 1888. *President*, C. R. Peaslee; *Vice-President*, Alex. Griswold; *Executive Committee*—C. R. Peaslee, Alex. Griswold and R L. Stevens; *Treasurer*, R. L. Stevens; *Secretary*, R. L. Stevens, 1100 West Main Street, Louisville, Ky. Place of meeting, No. 4 Mozart Building, 4th Avenue and Jefferson Streets. Ordinary meetings, second and fourth Thursdays of each month at 8 P.M. Annual meeting, second Thursday in February. Membership September 1: Active, 20; corresponding, 2. Total, 22. Exhibitions in connection with the American Lantern-Slide Interchange during the fall and winter months.

Lowell Camera Club, Lowell, Massachusetts.—Organized January, 1889. *President*, William P. Atwood; *Vice-President* Charles J. Glidden; *Executive Committee*, Officers of the Club; *Treasurer*, Henry W. Barnes; *Librarian*, Bert L. Williams; *Secretary*, George A. Nelson, 81 Appleton Street, Lowell, Mass. Place of Meeting, Central Block. Ordinary meetings, Third (3rd) Tuesday, November to March inclusive. Special meetings, subject to call of the President. Annual meeting, November. Membership, September 1: Honorary, 1; Active, 47; Associate, 3; Total 51. Exhibitions, November, 1890, projected for ensuing year. One or more field days.

Lynn Camera Club, The—42 Broad Street, Lynn, Mass. Organized, January 3, 1888. Incorporated December 20, 1889. *President*, William H. Drew; *Vice-President*, Joseph N. Smith; *Executive Committee*, Wm. H. Drew, J. N. Smith, W. H. Russell, W. B. Gifford, J. W. Gibboney, Dr. E. Williams, E. F. Bacheller, W. A. Porter; *Treasurer*, Edward F. Bacheller; *Librarian*, Dr. E. Williams; *Recording Secretary*, J. W. Gibboney; *Corresponding Secretary*, Walter A. Porter, 42 Broad Street,

Lynn, Mass. Place of meeting, Club House, 42 Broad Street, Lynn, Mass. Ordinary Meetings, first Tuesday in each month, at 8 o'clock P. M. Special Meetings, at the call of the President. Annual meeting, First Tuesday in January. Membership, September 1: Honorary, 1; Active, 62: Social, 38; Associate, 1; Total 102.

Marlborough (Mass.) Camera Club, The—*President*, H. C. Russell; *Vice-President*, A. M. Howe; *Secretary*, George L. Stevens; *Librarian*, J. F. Otterson; *Treasurer*, O. H. Stevens. Regular meetings, first Tuesday in each month, at houses of members. Field days, monthly from April to November. Membership September 1: Active, 20; associate, 16.

Millbury Camera Club.—Millbury, Mass. Organized October, 1888. *President*, T. D. Bristol, M.D.; *Vice-President*, Geo. H. Webber, M.D.; *Executive Committee*, T. D. Bristol, M.D., Chairman; E. B. Luce, T. E. Bottomley; *Treasurer*, T. E. Bottomley; *Secretary*, T. E. Bottomley, Box 582, Mtllbury, Mass. Place of meeting, Natural History Rooms. Ordinary meetings, first Monday in month, 7.45 P. M. Annual meeting, first Monday in June. Membership September 1: Honorary, 32; active, 15; corresponding, 2. Total, 49.

Milton and Mattapan Camera Club, The.—*President*, John Locklin; *Treasurer*, Alfred Karcher; *Secretary*, E. Sounenbrodt, Mattapan, Mass. Meetings at residence of the Secretary.

Minneapolis Camera Club.—*President*, F. E. Reading; *Vice-President*, J. W. Crocker: *Secretary*, C. A. Hoffman, 20 South Fourth Street, Minneapolis, Minn. Place of meeting, 20 South Fourth Street. Ordinary meetings, every second Thursday in month. Special meetings, call of President. Membership September 1: Active, 112. Exhibitions, monthly from October to March.

Mystic Camera Club, The.—Medford. Mass, Organized June 4th, 1889. *President*, Joseph H. Wheeler; *Vice-President*, Arthur F. Boardman; *Executive Committee*, J. H. Wheeler, A. F. Boardman, C. D. Tucker, Geo. L. Stone, E. H. Balcom, B. D. B. Bourne, W. C. Eddy; *Treasurer*, Chas. D. Tucker; *Secretary*, Geo. L. Stone, No. 1 Ashland Place, Medford, Mass. Place of meeting, Legion of Honor Hall, Medford. Ordinary Meetings, first Tuesday in each month, at 8 p.m. Special meetings, third Tuesday in the month, usually. Annual meeting, first Tuesday in January. Membership September 1: Active, 33. Total, 33. Exhibitions, annual exhibition in February, 1881.

* **New Brunswick Camera Club.**—New Brunswick, N. J. Organized October 1, 1888. *President*, Peter T. Austen; *Treasurer*, George K. Parsell; *Secretary*, Dr. Harry Tredwell, New Brunswick, N. J. Place of Meeting, Chemical Lecture Room of Rutger's College. Ordinary Meetings, first Wednesday in each month, at 8 P. M. Special Meetings, at call. Membership, September 1: Total, 30.

New Orleans Camera Club.—Organized 17th December, 1886. *President*, Horace Carpenter; *Vice-President*, Jos. A. Hincks; *Board of Directors*, Horace Carpenter, J. A. Hincks, P. E. Carriere, R. S. Charles, Jr.; *Treasurer*, P. E. Carriere; *Honorary President*, Harry T. Howard; *Secretary*, R. S. Charles, Jr., care Illinois Central R. R. Co., Cotton Exchange Building. Place of meeting, 3 Carondelet Street. Ordinary meetings 1st Wednesday each month 7.30 p. m. Informal meetings, every Wednesday, 7.30 p. m. Annual meeting, 1st Wednesday in

November. Membership September 1: Honorary, 11; active, 92; corresponding, 4. Total 107. Exhibitions, lantern, once a month, being members of American Lantern Slide Interchange of which L. E. Bowman is Director representing this club.

Newark Camera Club.—828 Broad Street, Newark, N. J. Organized April 17, 1888. *President*, Wm. A. Halsey; *Vice-President*, Charles Leroy; *Executive Committee*, Charles Leroy, Paul Thiery, J. M. Forte, H. C. McDougall, Miles I. Anson, Dr. T. Y. Sutphen, C. G. Hine, Frederick T. Fearey, Gus. J. Edwards; *Treasurer*, J. M. Foote; *Secretary*, C. G. Hine, 209 Washington Avenue, Newark, N. J. Place of meeting, 828 Broad Street. Ordinary Meetings, second and fourth Mondays of each month. Special meetings as called. Annual meeting second Monday in April. Membership May 1: Honorary 3; active, 56; associate, 4. Total, 63.

New York Camera Club, The—314 Fifth Avenue, New York, N.Y. Organized, 1888. *President*, David Williams; *Trustees*, H. J. Hardenbergh, Chairman, Edw. P. Fowler, M. D., Thos. Manning, Franklin Harper; *Executive Committee*, W. Townsend Colbron, Chairman, W. J. Cassard, J. H. Wainwright, the President and Secretary *ex officio*; *Treasurer*, Robt. J. Devlin, M.D.; *Secretary*, H. T. Duffield, 105 Maiden Lane, New Yokk. Place of meeting, 314 Fifth Avenue. Ordinary meetings second and fourth Mondays of each month, from October to June; 8.30 P.M. Membership May 1: Active, 99; corresponding, 1. Total, 100. Exhibitions next Spring, exhibition of photographs; lantern slide exhibitions once or twice a month during autumn, winter and spring.

* **Old Colony Camera Club.**—Rockland, Mass. Organized February, 1889. *President*, W. G. E. Freeman; *Vice-President*, David Smith; *Treasurer*, Burton O. Estes; *Librarian*, Frederick Ames; *Secretary*, Burton O. Estes, Rockland, Mass., P. O. Box 141. Place of meeting, Club Rooms, Liberty Street. Ordinary meetings Wednesday evenings at 7.30. Annual meeting first Wednesday in January. Membership, September 1: 10.

Oregon Alpine Club (Photographic Department.)—Portland, Oregon. Organized 1889. *President*, W. W. Bretherton; *Vice-President*, Otto Switzenberger; *Treasurer*, E. Morton; *Secretary*, E. Morton, Portland, Oregon. Place of Meeting, Oregon Alpine Club Rooms. Ordinary Meetings third Friday every month. Special Meetings subject to call of President. Annual Meeting third Friday in January. Membership September 1; Honorary, 6; active, 30. Total, 36.

* **Oregon Camera Club.**—Portland, Oregon. Organized July 1, 1886. *President*, W. W. Bretherton; *Vice-President*, M. Goldsmith; *Treasurer* (acting) and *Secretary*, Edw. Norton, Care Oregon Camera Club, 153½ Third Street, Portland, Oregon. Place of meeting 153½ Third Street. Ordinary meetings third Friday in each month. Special meetings whenever called. Annual meeting third Friday in January. Membership, September 1: Honorary, 5; active, 20; total, 25. Exhibition of Lantern Slides in October.

Pacific Coast Amateur Photographic Association (San Francisco, California.)—Organized February 19th, 1883; *President*, Edmund L. Woods; *VicePresident*, Major W. H. Heuer, U. S. A.; *Executive Committee*, Miss Hitchcock, Messrs. Oliver, Bull, Treat and

Tasheira; *Treasurer*, F. R. Ziel; *Secretary*, G. Knight-White, 89 Flood Building, San Francisco, Cal. Place of meeting, 605 Merchant Street, San Francisco, Cal. Ordinary meetings, monthly, 1st Thursday after 1st Monday. Special Meetings on the call of the President, or of three members. Annual meeting, the regular March Meeting. Membership September 1: Honorary, 5; active, 80; corresponding, 15; life, 5. Total, 105. Annual public exhibition in April.

Photographic Association of America, (U. S.)—Organized 1880. *President* for 1891, G. H. Hastings, Boston, Mass. *Vice-President*, 1st S. L. Stein, Milwaukee, Mo., 2nd W. Stuber, Louisville, Ky.; *Executive Committee*, the 5 elected officers; *Treasurer*, Dr. George M. Carlisle 330 C Street, N. W., Washington, D. C.; *Secretary*, W. A. Davis, 874 Broadway, N. Y. Place of meeting 1891, Buffalo, N. Y.

Photographic Association of Brooklyn.—Organized March 20, 1888. *President*, Charles Wapler; *Vice-President*, Dr. E. H. Riedel; *Executive Committee*, Dr. F. A. Schlitz, Dr. E. Rauth, G. W. Wundram; *Treasurer*, J. A. Gafney; *Librarian*, Wm. Lang, Jr.; *Secretary*, Charles M. Heid, 54 Stone Street, New York City. Place of meeting, Arion Hall, Wall Street. Ordinary meetings, first and third Wednesday each month, at 8 P. M. Annual meeting, third Wednesday in March. Membership September 1: Honorary 3; active, 33. Total, 36.

Photographic Section of the American Institute.—Organized March 27, 1859. *President*, Henry J. Newton; *Vice-President*, Cornelius Van Brunt; *Executive Committee*, Officers of the Society; *Treasurer*, Edward Schell; *Librarian*, John W. Chambers; *Secretary*. Oscar G. Mason, Photographic Department Bellevue Hospital, 26th Street and East River, New York City. Place of meeting, Institute Hall, 111–113–115 West 38th Street. Ordinary meetings, first Tuesday of each month, except July and August. Special meetings, on call of officers. Annual meeting, first Thursday in February. Membership, total, 1,769. Exhibitions, at Exhibition Hall each autumn, usually from October 1st to December 1st.

Photographic Section of the Cincinnati Society of Natural History, The.—Organized January 24th, 1884, *President*, T. B. Collier; *Vice-President*, H. C. Fithian; *Treasurer*, George Peck; *Librarian*, Arch. J. Carson; *Secretary*, Dr. James A. Henshall, 108 Broadway; *Corresponding Secretary*, T. H. Kelley, 64 W. Third Street. Place of meeting. No. 108 Broadway. Ordinary meetings, second and fourth Monday nights of each month, at 8 o'clock. Special meetings, on call of the President. Annual meeting, second Monday of April. Membership September 1: Active, 150.

Photographic Society of Philadelphia, The.—1,305 Arch Street. Organized November 26th, 1862. *President*, John G. Bullock; *Vice-President*, Joseph H. Burroughs; *Executive Committee*, Charles L. Mitchell, M.D., Ellerslie Wallace, M.D., Edmund Stirling; *Treasurer*, Samuel M. Fox; *Secretary*, Robert S. Redfield, 1,601 Callowhill Street. Place of meeting 1,305 Arch Street. Ordinary meetings, first Wednesday evening of each month, at 8 p.m. Conversational meetings, third Wednesday evening of each month. Annual meeting, first Wednesday evening in January. Membership May 1, 1890: Active and life, 211, Total, 211. Exhibitions, annual in connection with Society of Amateur Photographers of New York, and Boston Camera Club.

Photographic Society of Waterbury, The—Waterbury, Conn. Organized May, 1888. *President*, C. R. Pancoast; *Vice-President*, E. H. Everitt; *Executive Committee*—Hiram W. Hayden, chairman, E. W. Mooring, Jr., Samuel B. Hill; *Treasurer*, Geo. S. Husker; *Secretary*, E. E. Dewitt, Room 18, Baldwin's Block, Waterbury, Conn. Place of meeting, Room 18, Baldwin's Block. Ordinary meetings, first and third Fridays of each month at 8 P.M. Special meetings, on call of President. Annual meeting, first Friday in May. Membership September 1: Active, 23; corresponding, 2. Total, 25. Member of New England Lantern-Slide Interchange.

Pittsburgh Amateur Photographers' Society.—Organized May 11th, 1885. *President*, W. S. Bell: *Vice-President*, R. F. Smythe; *Executive Committee*—W. S Scaife, B. Speer, L. S. Clarke, A. M. Martin, A. R. Neeb; *Treasurer*, A. R. Neeb; *Librarian*, J. H. Hunter; *Secretary*, F. R. C. Parrin, Box 511, Pittsburgh, Pa. Place of meeting, No. 59 4th Avenue. Ordinary meetings, second Monday each month. Annual meeting, April, second Monday. Membership September 1: Honorary, 2; active, 65. Total, 67.

Plainfield Camera Club, The.—Organized 1887. Incorporated 1890. *President*, Oscar S. Teale; *Vice-President*, Daniel C. Adams; *Treasurer*, W. H. Lyon, Jr.; *Secretary* G. E. Greenleaf, Plainfield. N. J. Place of meeting, 17 E. Front Street. Ordinary meetings, third Tuesday in each month, at 8 P. M. Special meetings, on call. Annual meeting, third Tuesday in December, at 8 P. M. Membership September 1: Honorary, 2; active, 44. Total, 46. Exhibitions, annual fall exhibition November 24th to 29th, inclusive.

Postal Photographic Club.—Headquarters at West Chester, Pa. Organized December, 1888. *President*, Randall Spaulding, Montclair, N. J. *Treasurer*, Dr. J. Max Mueller, West Chester, Pa.; *Secretary*, Dr. J. Max Mueller, West Chester, Pa. Membership September 1: Active, 28. Total, 28. Publications, one album and note-book each month. Members must furnish two or more prints of their own individual work for each album, which circulate twice and are accompanied by note-books in which criticisms of exhibited prints, full data, suggestions, etc., etc., are entered.

Providence Camera Club.—87 Weybosset Street, Providence, R. I. Organized February, 1884. Incorporated, 1889. *President*, R. Clinton Fuller; *Vice-President*, L. L. Anderström; *Executive Committee*, President, Secretaries, Treasurer, Ex-officio, Henry J. Reynolds, Joseph A. Miller, Jr., L. L. Anderström, William L. Coop, Henry H. Davison; *Treasurer*, Arthur B. Ladd; *Librarian*, William A. Chandler; *Recording Secretary*, Charles A. Stoddard; *Corresponding Secretary*, J. Elliot Davison, 87 Weybosset Street, Providence, R. I. Place of Meeting, Club Rooms, 87 Weybosset Street. Ordinary Meetings, first Saturday and Tuesday after third Saturday in each month. Special Meetings, at call of President. Annual Meeting, first Saturday in March.

Quebec Camara Club.—Quebec, P. Q. Organized February 8, 1887. *President*, J. George Garneau, St. Peter Street, Quebec; *Executive Committee*—Capt. W. E. Imlah, J. B Amyot, W. E. Russell; *Treasurer*, James Brodie; *Secretary*, Ernest Würtele, 93 St. Peter Street, Quebec. Place of meeting, Captain Imlah's Quarters, Citadel. Annual meeting, second Monday in December. Membership, September 1; Active, 10; Total, 10.

Selma (Ala.) Amateur Photographic Society.—(Formerly F. M. C. A. Camera Club). Reorganized April 9, 1890. *President*, Watkins Vaughan; *Board of Managers*, G. B. Johnson, H. V. Bachelder; *Librarian*, Mrs. G. B. Johnson; *Secretary and Treasurer*, S. Orlande Trippe. Place of Meeting, Johnson's Studio. Ordinary Meetings first and third Wednesdays, 8 o'clock, P. M. Special Meetings at call of President. Annual Meeting, first meeting in January. Membership April 9: Active, 16. Publications, *St. Louis and Canadian Photographer*, *The Photographic Globe*, *Practical Photographer* (London, Eng.), *American Amateur Photographer.*

Silver State Camera Club.—Organized September 1890, *President*, Rev. J. L. Logan. *Vice-President*, Mr. C. A. Hoffer. *Secretary*, Mr. P. H. Gordon, address Carson City, Nevada. *Treasurer*, Mr. C. H. Peters. Meetings to be held the second Tuesday after the first Monday of each month.

Society of Amateur Photographers of New York.—No. 12 West 31st Street. Organized March 28th, 1884. *President*, James H. Stebbins, Jr.; *Vice-President*, A. L. Simpson; *Board of Trustees*, Jas. H. Stebbins, Jr., A. L. Simpson, T. J. Burion, F. C. Beach, E. Warrin, C. C. Roumage, Jr., Fred Vilmar, R. L. Bracklow, L. B. Schram, H. W. Tieman, R. A. B. Dayton, Fer'd Ruppert, J. V. Black; *Treasurer*, C. C. Roumage, Jr.: *Librarian*, R. L. Bracklow; *Secretary*, T. J. Burton, 46 West 15th Street, New York; *Corresponding Secretary*, F. C. Beach, 361 Broadway. Place of meeting, 12 West 31st Street, near Fifth Avenue. Regular meetings, second Tuesday of each month, at 8.30 p.m. Lantern Slide nights every Friday evening at 8.30 p.m. Annual meeting, second Tuesday in April. Membership May 1st 1890: Honorary, 13; Active, 130; Subscribing, 12; Corresponding 49; Total 204. Publications, "Journal of the Society of Amateur Photographers of New York." Exhibitions, Triennial, in connection with Boston and Philadelphia Societies. Next occurs June, 1891.

Southern Tier Photographic Association, Steuben and Adjoining Counties.—Organized May 10, 1888. *President*, A B. Stebbins, Canisteo, N. Y.; *Vice-President*, C. R. Carson, Hornellsville, N. Y.; *Treasurer*, W. L. Sutton, Hornellsville, N.Y.; *Secretary*, H. M. Beeles, Hornellsville, N. Y. Place of meeting, according to adjournment, usually in Hornellsville. Ordinary meetings, quarterly, 1st Monday of March, June, September, and December, evenings, hour subject to call. Annual meeting, June, 1st Monday, evening. Membership September 1: Honorary, 5; active, 16; total, 21.

Springfield Camera Club.—Organized in 1886. *President*, John Leshure; *Secretary*, W. M. Lester; *Treasurer*, H. N. Bowman; *Librarian*, C. C. Morgan, C. A. Emery; *Executive Committee*, John Leshure, W. M. Lester, H. N. Bowman, C. C. Morgan, C. A. Emery; *Room Committee*, John Leshure, chairman, H. N. Bowman, R.W. Adams.

St. Louis Camera Club.—Organized 1885, incorporated 1889. *President*, Robert E. Collins. *Vice-President*, John B. Holman. *Executive Committee*, Robert E. Collins, John B. Holman, Elliot Jewet, C. M. Alexander. *Secretary*, Samuel B. Ball, Laclede Building, St. Louis, Missouri. Place of meeting 23rd Street and Lucas Place. Ordinary meetings 1st and 3rd Tuesday in each month. Special meetings subject to call. Annual meeting 1st Tuesday in April of each year. Membership September 1: Honorary, 18, active, 69, associate, 5, total, 92. Exhibitions one each month, date fixed from time to time.

Stevens Photographic Society.—Hoboken, N. J. Organized 1887. *President*, A. R. Whitney, Jr.; *Vice-President*, Ernest A. Peabody; *Treasurer*, C. E. Pearce; *Secretary*, E. W. Frazar, Stevens Institute of Technicology, Hoboken, N. J. Place of Meeting, Stevens Institute. Ordinary Meetings, called at order of President. Annual Meeting, first Monday in October. Membership September 1: Active, 25. Exhibitions held in December and April.

Syracuse Camera Club.—324 South Salina Street, Nô. 6 Butler Block, Syracuse. Organized October 4, 1886. *President*, Arthur P. Yates: *Vice-President*, Amos Padgham; *Executive Committee*, Arthur P. Yates, *Board of Managers*, Amos Padgham; *Directors*, *Council*, Chas. R. Jones, Wallace Dickson; *Treasurer*, Chas. R. Jones; *Secretary*; Wallace Dickson, Box 173, Syracuse, P. O. Place of meeting, No 6. Butler Block, 324 South Salina Street. Ordinary Meetings every Friday evening at 8 P.M. Special Meetings at call of Executive Committee. Annual Meeting first Friday of January. Membership, September 1: Active, 65.

"Tech" Camera Club.—Worcester Polytechnic Institute, Worcester, Mass. Organized September 28, 1889. *President*, L. E. Booth; *Vice-President*, H. H. Tracy; *Executive Committee*, H. P. Davis, L. E. Booth, H. P. Crosby, J. P. Anderson, H. Sinclair; *Treasurer*, H. P. Wires; *Keeper*, A. P. Smith; *Secretary*, C. A. Davis, No. 14 Goulding Street, Worcester, Mass. Place of meeting, Boynton Hall. Ordinary meetings, every second Saturday evening at 7.30. (Vacations excepted.) Beginning on the second Saturday of school year. Semi-Annual Election, second Saturday in school half year. Membership May, 1890: Honorary, 6; active 27: Total, 33. Exhibition of Photographs, February and June. Lantern Slide Exhibition, May.

Toronto Amateur Photographic Association.—Organized 1887. *President*,. W. B. McMurrich; *Vice-President*, F. D. Manchee; *Executive Committee*—Dr. Ellis, Hugh Neilson, G. S. C. Bethune, R. Muntz, A. E. Irow, T. Langton; *Treasurer*, E. H. Walsh; *Secretary*, E. H. Walsh. Place of meeting, College of Physicians and Surgeons. Ordinary meetings, Monday evenings, monthly, 1st Monday of each month. Annual meeting, 1st Monday in November. Membership September 1: Active, 60; corresponding, 2; total, 62. We expect to have an exhibition in the spring and another in the fall.

Washington Camera Club.—Organized, November 1883, as the "Argents." Reorganized, March 19th, 1887. Incorporated May 10th, 1888, as the "Washington Camera Club. *President*, Max Hansman, *Vice-President*, A. Lee Fearn. *Board of Trustees*, Max Hansman, R. Dickinson Jewett, Edgar Richards, W. E. Schneider, G. A. Warren; *Treasurer*, A. M. Lothrop. *Secretary*, R. Dickenson Jewett; *Corresponding Secretary*, J. Albert Cole, office Supv'y Architect, U. S. Treas. Dept. Washington, D. C. Place of meeting 1420 Pa. Avenue. Ordinary meetings 2nd Tuesday in June, July, August and September, 2nd and 4th Tuesdays in remaining months. Special meetings on call. Annual meeting 2nd Tuesday in January. Membership September 1: Honorary, 2; active, 30; passive, 8. Total, 30.

Worcester Lantern Slide Club.—Organized February 19, 1889. *Secretary*, G. E. Francis, M.D., 9 Elm Street Worcester, Mass., only officer. Place of meeting, 9 Elm Street. Ordinary meetings last Tuesday of each month, at 7.30 p. m. Annual meeting, October. Membership September 1: Active 10. Total, 10. Exhibitions of Slides, about eight in the winter.

Yonkers Photographic Club, The—Deyo Building, Yonkers, N.Y. Organized February 8, 1889. *President*, John W. Alexander; *Board of Directors*, John W. Alexander, F. W. R. Eschmann, R. Eickemeyer, Jr., Robert M. Reevs, Geo. J. Stengel; *Treasurer*, Robert M. Reevs; *Librarian*, W. Blackburn; *Secretary*, Robert M. Reevs, Box 720, Yonkers, N. Y. Place of meeting, Deyo Building. Ordinary meetings first Friday of every month at 8 P.M. Special meetings on request of ten members. Annual meeting last Friday in April. Membership September 1: Active, 42. Total, 42. Exhibitions, Photographs, May 12th to 19th, 1890. Lantern Slides in the Fall of 1890.

* **Zanesville Camera Club, The**—Zanesville, Ohio. Organized March 15, 1888. *President*, E. W. Harvey; *Vice-President*, E. C. Downard; *Board of Managers*, M. J. Harkins, Edgar M. Hatton, E. C. Downard, B. V. H. Schultz; *Treasurer*, Edgar M. Hatton; *Librarian*, C. A. Flammer; *Secretary*, B. V. H. Schultz, 49 South Fifth Street, Zanesville, Ohio. Place of meeting, Rooms 1, 2, 3 & 4, 14½ South Sixth Street. Ordinary Meetings, first Tuesday each month, at 8 P.M. Special meetings, third Thursday in any month, at 8 P.M. Annual meetings, second Thursday in March. Membership, September 1; Honorary, 5; Active, 17; Corresponding, 2; Total, 24.

Mexico.

Sociedad Fotografica Mexicana.—Organized in the City of Mexico, July 6, 1890. *President*, Fernando Ferrari Perez; *Vice-President*, Manuel G. Prieto; *Executive Committee*, Guilermo By Puga, Dr. Fernando Altamarino, Ignacio Molina, Manuel Buen Abad; *Treasurer*, Luis G. Ruiz; *Librarian*, Prof. Francisco Rio de la Loza; *Secretary*, Engineer Vicente Vargas Galeana. Place of meeting, City of Mexico. Ordinary meetings, Two Sundays each month. Membership September 1: Honorary, 3; active, 73; corresponding, 10. Total 86.

FOREIGN PHOTOGRAPHIC SOCIETIES.

Great Britain and British Colonies.

Amateur Photographic Association.—Honorary Secretary, Arthur James Melhuish, Esq., F.R.A.S. & F.R.Met.Soc., 58 Pall Mall, London, S. W.

Amateur Photographic Association of Victoria Melbourne.—Secretary, J. H. Harvey, 97 Victoria Parade, East Melbourne, Australia.

Bath Photographic Society.—Hon. Secretary and Treasurer, W. Middleton Ashman, 12A Old Bond Street, Bath.

Birkenhead Photographic Association.—Hon. Secretary, C. B. Reader, Mountside, Rowson Street, New Brighton, Birkenhead.

Birmingham Photographic Society.—Secretaries, J. H. Pickard, 361 Moseley Road, Birmingham; A. J. Leeson, 20 Cannon Street, Birmingham.

Bolton Photographic Society.—Secretary, B. H. Abbott, 12 Corporation Street, Bolton.

Brighton Photographic Society.—Secretary, A. H. C. Corder, 42 Montpelier Road, Brighton.

Bristol and West of England Amateur Photographic Association.—Hon. Secretary and Treasurer, Fred. Bligh Bond, Fern Hollow, Stoke Bishop, Bristol.

British Association for the Advancement of Science.—Section B, Chemical Science. Secretary, C. H. Bothamley, F.C.S., F.I.C., 22 Albemarle Street, Piccadilly, London, W.

Brockley and St. John's Scientific Society.—Secretary, L. M. Biden, 11 Leadenhall Street, London, E. C.

Camera Club.—Secretary, George Davison, 21 Bedford Street, London, W. C.

Canadian Lantern Slide Interchange.—Hon. Secretary, E. Havelock Walsh, 219 Beverly Street, Toronto.

Devon and Cornwall Camera Club.—Hon. Secretaries, Major R. Barrington Baker, H. M. Gunwharf, Devonport; W. Gage Tweedy, 8 Athenæum Terrace, Plymouth.

Dukinfield Photographic Society, The—Secretary, Tom Borsey, Town Lane, Dukinfield, Cheshire.

Edinburgh Photographic Club.—Secretary, Jas. C. H. Balmain, 13 Maitland Street, Edinburgh.

Glasgow Photographic Association.—Secretary, J. Craig Annan, 153 Sauchiehall Street, Glasgow.

Gloucestershire Photographic Society.—Secretary, A. H. Clinch, Wotton, Gloucester.

Hawaiian Camera Club.—President, George W. Smith; Secretary, J. A. Gilman, Honolulu, H. I.

Herefordshire Photographic Society.—Secretary, John Parker, City Engineer, Hereford.

Hyde Photographic Society.—Secretary, Wm. H. Middleton, 8 Hyde Lane, Hyde.

Ipswich Photographic Society.—Honorary Secretary and Treasurer, E. R. Pringle, 83 Berners Street, Ipswich.

Leamington Amateur Photographic Society.—Secretary, F. M. Gowan, 20 Beauchamp Square, Leamington Spa.

Leeds Y. M. C. A. Photographic Club.—Secretary, F. W. Fisher, 9 Meanwood Terrace, Servia Grove, Camp Rd., Leeds.

Leeds Photographic Society.—Hon. Secretary, S. A. Warburton, 9 Banstead Terrace, Roundhay Road, Leeds.

Leicester and Leicestershire Photographic Society.—Secretary, Henry Pickering, High Cross Street, Leicester.

Leith Amateur Photographic Association.—Secretary, A. D. Guthrie, 7 Pitt Street, Leith, Scotland.

Leytonstone and Epping Forest Photographic Society.—Secretary, Mr. Joseph W. Spurgeon, 1 Drayton Villas, Leytonstone, Essex.

Liverpool Amateur Photographic Association.—Secretary, Edward M. Tunstall, 3 Lord Street, Liverpool.

London Social Camera Club.—Secretary, Herbert Smith, 41 Alkham Road, Stamford Hill N., Strand, W. C.

London and Provincial Photographic Association. — Hon. Secretary and Treasurer, F. A. Bridge, East Lodge, Dalston Lane, N. E.

Maidstone Amateur Photographic Club.—Secretary, Lionel Stansell, F.C.S., 167 Boxley Road, Maidstone, Kent.

Manchester Amateur Photographic Society, The—Secretary, R. O. Gilmore, Solicitor, 1B Cooper Street, Manchester.

Newcastle-on-Tyne and Northern Counties Photographic Association.—Secretary, Edgar G. Lee, 11 Beverley Terrace, Cullercoats, Newcastle-on-Tyne.

North Kent Amateur Photographic Society, The—Secretary, G. W. Cobham, 3 Edwin Street, Gravesend, Kent, England.

North Middlesex Photographic Club.—Hon. Secretary, Geo. R. Martin, Harringay Park Granary, Green Lanes, Finsbury Park.

North Surrey Photographic Society, The.—Secretary, Harold Senier, F. I. C., F. C. S., 88 Norwood Road, London, S. E.

Nottinghamshire Amateur Photographic Association.—Hon. Secretary, P. E. Wright, Esq., Java Villa, Blythe Street, Mapperley, Nottingham.

Oldham Photographic Society.—Hon. Secretary, Thomas Widdop, 16 Burnaby Street, Oldham.

Paisley Photographic Society.—Secretary, David B. Jack, Blackhall, Paisley.

Peterborough Photographic Society.—Secretary, A. W. Nicholls, 11 Cromwell Road, Peterborough.

Photographers' Benevolent Association.—Secretary, Mr. H. J. Beasley, 65 and 66 Chancery Lane, London.

Photographic Convention of the United Kingdom, The—Secretary and Treasurer, H. Briginshaw, 128 Southwark Street, London.

Photographic Section, Kendal Literary and Scientific Institution.—Secretary, Charles E. Greenall, Prospect, Kendal.

Postal Photographic Society.—Hon. Secretary, Martin J. Harding, 6 College Hill, Shrewsbury.

Reading Amateur Photographic Society.—Secretary, Mr. J. Phillips, 10 Abbott's Walk, Reading.

Shropshire Camera Club.—Secretary, Walter W. Vaunton, Kingsland, Shrewsbury.

Southport Photographic Society.—Secretary, Dr. H. L. Hawksley, 76 Roe Lane, Southport, Assistant Secretary, J. S. Dickin, L. D. S., Hoghton Street, Southport.

Southsea Amateur Photographic Society.—Hon. Secretary, F. Lord, L. R. C. P., etc.,Wilton House, Landport Terrace, Southsea.

Stockton Photographic Society.—Secretary, Frank Appleby, Rosslyn Terrace, Stockton-on-Tees.

Surbiton Amateur Photographic Society.—Secretary & Treasurer, A. E. Lane, The Ferns, King Charles Road, Surbiton, Surrey.

Swansea Amateurs Photographic Association.—Secretary, E. Ernest Morgan, Bryn-Naut, Swansea.

Tasmanian Photographic, Science and Art Association, Hobart. —Secretary, Nat. Oldham, 92 Argyle Street, Hobart.

The Auckland Camera Club.—Secretary, Robert B. Walrond, St. Stephen's Avenue, Parnell, Auckland, New Zealand.

The Photographic Club.—Hon. Secretary and Treasurer, F. A. Bridge, East Lodge, Dalston Lane, London, N. E.

The Photographic Society of India.—Hon. Secretaries, A. Flemming, J. S. Gladstone, 29 Chowringhee, Calcutta.

The Yorkshire College Photographic Club.—Secretary, Harry B. Hall, 20 Regent Terrace, Edwin Road, Leeds.

Toynbee Camera Club.—Secretary, A. E. Birch, 35 Heathland Road, Stoke Newington, N.

Victoria Camera Club, The—Secretary, Alf. Hy. Farmer, 54 Elizabeth Street, Melbourne, Victoria, Australia.

Wallasey Photographic Association.—Secretary, George G. Breading, 72 Church Street, Egremont, Cheshire, England.

Walton Photographic Society.—Secretary, Jno. Kennedy, 65 Carisbrooke Road, Walton, Liverpool.

Worcestershire Camera Club.—Secretaries, Mr. Acton Bucknall, Fanche Court, Kidderminster, Mr. William Ray, School of Science, Kidderminster.

York Photographic Society.—Secretary, Fred. G. Benson, 18 Russell Street, York.

Yorkshire Philosophical Society. Photographic Section.—Hon. Secretary, Henry R. Moiser, F.G.S., Heworth Grange, York, England.

Germany,

Berlin Freie Photographische Vereinigung.—President, Prof. Dr. Gustav Fritsche, Hotel Jansen Mittelstrasse, 53 and 54, N. W.

Berlin Deutsche Gesellschaft von Freunden der Photographie.—Secretary, Dr. W. Zenker, Metzstrasse, W.

Berlin Photographischer Verein.—President, Dr. F. Stolze, Charlottenburg, Salzufer, 23.

Berlin Verein zur Forderung der Photographie.—President, Prof. Dr. H. W. Vogel, Kurfürstenstrasse, 124 a W.

Berlin Verein der Photographen Gehilfen.—Per addr. Edward Gunther, Zionskirchste, 37 II. N.

Deutscher Photographen Verein, Weimar.—Secretary, O. Gebhardt in Halle a/S Saale; Address, K. Schwier in Weimar.

Dresden Photographen Gehilfen Verein.—President, P. Fehmer, Kreuzstrasse, 19 Restaurant Fuchesbau.

Frankfurt o|M. Verein zur Pflege der Photographie und Verwandter Kunste.—Per addr. H. P. Hartmann, Eckenheimer, Landstr. 70.

Hamburg-Altoona Photographische Gesellschaft.—President, G. Wolf. Addr. Augustinerbrän, Alter Jungfernstieg.

Hanover Photographisher Verein.—President, Major von Hammerstein, Lutherstrasse, 17, II

Hamburg Verein Photographischer Mitarbeiter.—Addr. W. Poppe, sen., Hamburg, Newstadt Fuhlentwiete, Nürnberger Bierhalle.

Magdeburg Verein der Photographer Gehilfen.—Hon. President, E. von Flottwell, per addr. Rud. Welter, Knochenhauersuferstrasse, 27-28 II.

Munchen Photographische Gesellschaft.—Per addr. Paul Zschokke, Landwehrstrasse, 31.

Nurnberg Photographen Verein.—Per address, Fr. Schönninger, Apotheker, Obere Canal Street, 8 a.

Rheinisch-Westphalischer Verein zur Pflege, der Photographie und Verwandter Kunste.—President, Th. Creifelds, Cologne, a/R,

Photographische Gesellschaft von Essen und benachbarten Stadten.—President, H. Wittcamp, Hügelstrasse, 49.

Schlesiche Gesellschaft von Freunden der Photographie.—President, Prof. Dr. A. Neisser, Museumstrasse, 11.

Schleswig-Holstein Photographen Verein.—President, Ad. Wilhelm Dreesen, Hofphotograph, Flensburg.

Austria-Hungary.

Vienna Club der Amateur Photographen.—President, Carl Srna, Wallfischgasse, 4 Wien I.

Vienna Photographische Gesellschaft.—President, Lieut.-Colonel Ottomar Volkmer. K. K. Hof und Staatsdruckerei.

Vienna Verein Photographischer Mitarbeiter.—Seer. Andreas, Deutsch. Paniglegasse, 17 Zum Goldnen Sieb, Wien IV.

Switzerland.

Schweizericher Photographen Verein.—President, A. S. E. Priscam. Génève.

Societe Genevoise de Photographie.—President, H. C. Nerdinger. Généve.

Société Photographique de Lausanne.—President, J. Sassard.

Zurich Photographicher Club.—President, K. Nussbamnor.

France.

Photo-Club de Paris.—President, Adr. C. Rongier, 40 Rue de Mathurins.

Société Francaise de Photographie.—Secretary, Perrot de Chaumeux, 18 Rue de Seine, Paris.

Société Photographique de Limoges.—President, de Varaignes.

Société Nantaise de Photographie.—President, Basher, 8 Rue St. Laurent, Nantes.

Société Photographique du Nord de la France.—Secretary, M. Cocheteux, Rue Fortier, au Musée. Duai, Nord.

Société Photographique du Sud-Ouest.—President, Adr. F. Braun Angoulême.

Syndicate General de la Photographie et de ses Applications.—President, Léon Vidal, 7 Rue Scheffer, Paris.

Société Photographique et Artistique de Limoges.—Secretary Général, De Galard-Béarn, Avenue du Crucifix 5.

Belgium.

Association Belge de Photographie.—Secretary, Ch. Puttemens, Rue du Moulin, 51a Bruxelles.

Holland.

Amateur Fotografen Vereeninging.—Secretary, J. J. M. Guy de Coral. Leidschegracht, 64 Amsterdam.

Nederlandsche Vereeninging von Dilettant Fotografen, Helios.—Prof. Dr. Van Haren Noman. Huddestreet, No. 1 Amsterdam.

Denmark.

Dansk Fotografisk Forening Kjobenhavn.—Secretary, M. Steenbro, Bredgade, No. 20, Copenhagen.

Sweden.

Svenska Fotografi-Amator-Forening.—A. Section Stockholm, President, Prof. Elias Heyman, High School. B. Section Upsala, President, N. C. Dunir, Prof. of Astronomy.

Norway.

Norsk Fotografisk Forening.—President, L. Szaeinsky, Christiania.

Russia.

Imperial Society of Technology.—Section V. Photography, President, S. Levitsky, Pantelejmonskaja, 2, St. Petersburg.

Amatör fotografi Klubben i Helsingfors.—Hon. Treasurer, Chas. Hamfeldt, Helsingfors, Finland.

Italy.

Societa Fotografica Italiana.—Secretary, Cmt. Guido Vimercati, Via Sta. Repardata, 60, Florence.

Associazione degli Amatori di Fotografia.—President, Due d'Artalia Antonio Ruffio, via Poli 25, Rome.

PHOTOGRAPHIC PERIODICALS.

AMERICAN.—WEEKLY.

The Photographic Times. W. I. Lincoln Adams, Editor; Prof. Charles Ehrmann, Associate Editor. The Photographic Times Publishing Association, 423 Broome Street, New York.

The Photographic Eye. C. Gentilé, Editor, Chicago, Ill.

SEMI-MONTHLY.

Wilson's Photographic Magazine. Edward L. Wilson, 853 Broadway, New York.

Anthony's Photographic Bulletin. Prof. Charles F. Chandler, Editor; Dr. Arthur H. Elliott, Associate Editor. E. & H. T. Anthony & Co., 591 Broadway, New York.

MONTHLY.

The Photographic Times. (Monthly parts.)

The St Louis and Canadian Photographer. Mr. W. H. H. Clark, Editor. Mrs. Fitzgibbon-Clark, St. Louis, Mo., Publisher.

The American Journal of Photography. T. H. McCollin, Editor. Thos. H. McCollin, 635 Arch Street, Philadelphia, Pa.

The Beacon. Dr. John Nicol, Editor. The Beacon Publishing Co., Tribune Building, Chicago, Ill.

The American Amateur Photographer. W. H. Burbank, F. C. Beach and Catharine Weed Barnes, Editors. W. H. Burbank, Brunswick, Maine.

The Photographer. Dr. Arthur Le Boutillier, Editor. Denisen & Co., Cincinnati, Ohio. (Established October, 1889.)

The Photographic Herald. Laury MacHenry, Editor. Chas. H. Loeber, 111 Nassau Street, New York City.

The Photographic Globe. Maximilian Toch, Editor. Photographic Globe Publishing Co., 86 Walker Street, New York City.

YEARLY.

The American Annual of Photography and Photographic Times Almanac. C. W. Canfield, Editor. The Scovill & Adams Co., 423 Broome Street, New York.

Photographic Mosaics. Edward L. Wilson, 853 Broadway, New York.

The International Annual. W. Jerome Harrison and Arthur H. Elliott, 591 Broadway, New York.

ENGLISH.—WEEKLY.

The British Journal of Photography. Henry Greenwood & Co., 2 York Street, Covent Garden, London.

The Photographic News. Piper & Carter. 5 Furnival Street, Holborn, London, E. C.

Photographic Societies Reporter. Ed. by C.W. Hastings, and Lyman Clark, London, Hazell, Watson & Viney.

Photography. London, Iliffe & Son, 3 St. Bride Street, Ludgate Circus, London, E. C.

The Photographic Review. London.

Optical Magic Lantern Journal and Photographic Enlarger. Woodford, Fawcett & Co., London.

The Amateur Photographer. C. W. Hastings, 22 Buckingham Street, Strand, London, W. C.

MONTHLY.

The Journal and Transactions of the Photographic Society of Great Britain, London.

The Practical Photographer. Bradford, P. Lund & Co.

Transactions of the Edinburgh Photographic Society.—G. G. Mitchell, Hon. Secretary, 2 Baxtor Place, Edinburgh, Scotland.

Proceedings of the Glasgow Photographic Association. 207 Bath Street, Glasgow, Scotland.

The Photographers' World.—Percy Lund & Co., Bradford, England.

The Camera.—Wyman & Sons, 74 Great Queen Street, London, W. C.

The Photographic Art Journal.—Messrs. Smith & Botwright, 6 Eldon St., Finsbury, E. C.

Journal of the Photographic Society of India. Calcutta.

Photographic Answers. Marion & Co.

YEARLY.

The British Journal Photographic Almanac. London. H. Greenwood & Co., 2 York Street, Covent Garden, London.

The Year Book of Photography and Photographic News Almanac. London. Piper and Carter, 5 Furnival Street.

GERMAN AND AUSTRIAN.—WEEKLY.

Deutsche Photographen-Zeitung. K. Schwier, Weimar. Est. Oct. 1, 1877.

Photographisches Wochenblatt. Dr. A. Miethe. Potsdam. Lennéstrasse, 76, B. Est. 1875.

Photographisches Nachrichten. Ed. by Dr. F. Stolze. Bismarck Str., 20, Charlottenburg, Berlin.

FORTNIGHTLY.

Photographische Mittheilungen. Prof. Dr. H. W. Vogel, Editor, 124 Kurfuersten Street, W., Berlin. Robert Oppenheim, Publisher, Berlin, Est. April 1, 1864.

Photographisches Archiv. E. Liesegang, Düsseldorf, Editor. Est. 1860.

MONTHLY.

Photographische Correspondenz. Ludwig Schrank, Haupt-strasse, 9, Vienna, Austria. Est. 1864.

Photographische Notizen.—C. Schierer, 9 Tuchlauben, Vienna, Austria. Est. 1865.

Photographischer Beobachter. C. Groll, Guben. Est. 1880.

Der Photographische Mitarbeiter. Hans Lenhard, Vienna, Austria, Neu-Fünfhaus, No. 7 Neubaugürtel, Vienna. Est. 1885.

Photographische Rundschau. Editor, Chas. Scolik, Piaristengasse 48, Vienna, Austria. Publisher, W. Knapp, Halle, a/S. Germany. Begun Jan. 1, 1887.

Der Amateur Photograph. Dr. Paul Liesegang, Düsseldorf. Begun Jan. 1, 1887.

Die Sonne. Est. 1888. Edt. and Pub., Otto Schwaben, Deutz. (Prussian Rhein-Province).

QUARTERLY.

Lanterna Magica. Est. 1887. Edt. and Pub., E. Liesegang, Düsseldorf.

OCCASIONAL.

Photographischer Anzeiger (advertising). Friedr. Stern, Munich, Sendlingshofer Platz, 9.

Flugblätter für Practische Photographie und verwandte Fächer. Friedrich Stern, Munich.

Allgemeiner Anzeiger für Photographen. Ad. Krieg, Dresden.

YEARLY.

Deutscher Photographen-Kalender. Weimar. Editor, K. Schwier. Publisher, *Deutsche Photographen Zeitung.* Est. 1880.

Photographischer Almanach und Kalender. Düsseldorf. Ed. Liesegang. Est. 1860. Suspended, 1863–1882.

Jahrbuch für Photographie und Reproductionstechnik. Dr. Josef Maria Eder, Editor. Published by W. Knapp, Halle, a/S. Est. 1887.

Taschen-Notizbuch für Amateur Photographen, by Ludwig David and Charles Scolik. Est. 1888. Publ. W. Knapp, Halle a/S.

FRENCH.—WEEKLY.

L'Amateur Photographe. G. Rongier, 24, Boulevard St., Germain, Paris.

FORTNIGHTLY.

Le Moniteur de la Photographie. L. Vidal, 13, Quai Voltaire, Paris.

Helios. Boulevard de la Seune, 103, Brussels. 6 fr. per year.

MONTHLY.

Bulletin de la Société Francaise de Photographie. Rue Louis le Grand, 20, Paris.

Le Progrès Photographique. 22, Passage des Petites-Ecuries, Paris. Leon Wolff, Editor. Est. 1884.

Revue-Photographique. E. Letellier, Editor, 11 Rue des Pénitents, Havre.

Bulletin de la Société Photographique de Toulouse. Toulouse.

Journal de l' Industrie Photographique. Gauthier-Villars, 55 Quai d'Augustin, Paris.

Bulletin Official de la Société des Employés en Photographie. 15 Rue Breda, Paris.

Journal de la Photographie Applique aux Sciences d'Observation. 12 Rue Hautefeuille, Paris.

Bulletin de la Société Versaillaise.

Bulletin de la Société Photographique du Nord de la France. Douai. Adr. Au Musée, Douai (Nord).

Bulletin de la Sociéte Photographique de Nantes.

Revue Suisse de Photographie. 6 Rue des Philosophes, Geneva.

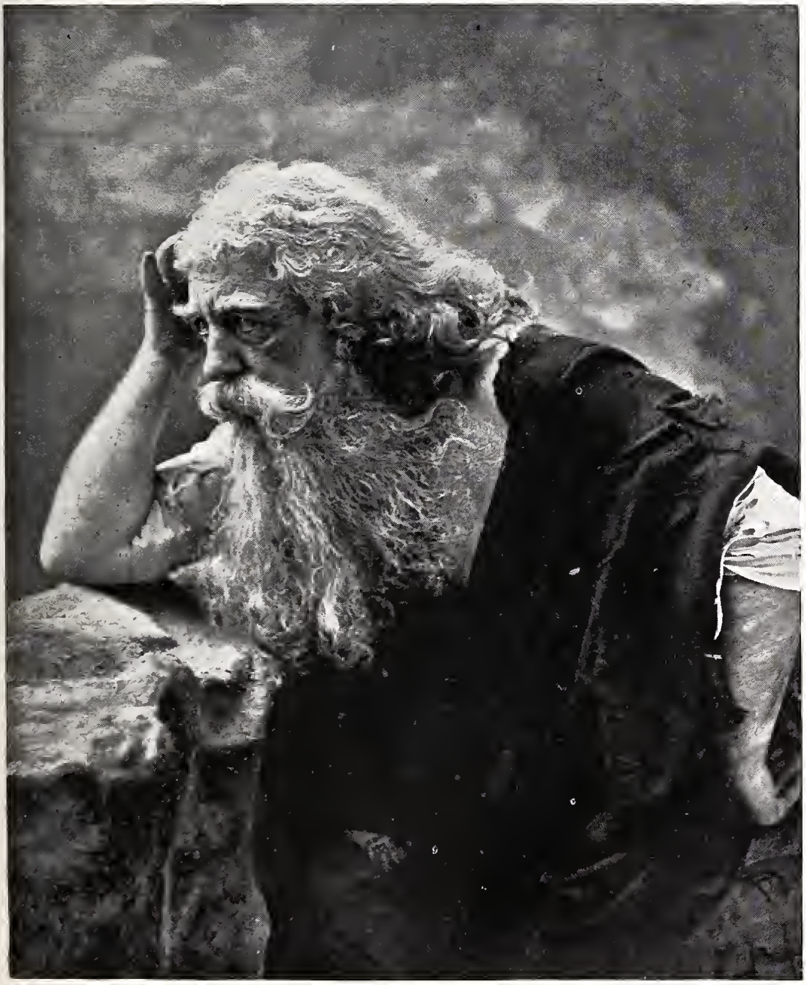
La Photographie Française. 25 Quai des Augustins.

Bulletin des Sociétés Photographiques de France. Gabriel Rongier, Editor. 24 Boulevard St., Germain, Paris.

YEARLY.

Aide Mémoire de Photographie. Gauthier-Villars, 55 Quai d'Augustin, Paris, Publisher. C Fabre, Editor.

L'Agenda de l'Amateur Photographe. G. Rongier, 24 Boulevard St., Germain, Paris.



Negative by H. McMichael, Buffalo, N. Y Photo-Engraving Co., N. Y.

ENOCH ARDEN.

From the collection exhibited at Washington.)

Carnet du Photograph-Amateur. Paris, J. Michelet.

Les Annales Photographiques. E. B. de Raymond et Charles de Thierry. Editors, 8 Passage des Petites Ecuries, Paris.

BELGIAN.—MONTHLY.

Bulletin de l'Association Belge de Photographie. O. Campo, 37 Rue Souveraine, Brussels.

DUTCH—MONTHLY.

Tidschrift voor Photographie. A. W. Groote, Amsterdam.

De Navorscher op het Gebied der Photographie. Amsterdam.

Photografisch Maandblad. Organ von der Amateur Fotografen Vereeniging, Amsterdam.

DANISH.—MONTHLY.

Beretninger fra Dansk Fotografisk Forening, Kopenhagen. J. Petersen, Ostergade, 34. A. E. M. Schleisner, Editor.

Fotografiske Meddelesser, Kopenhagen.

SWEDISH.—MONTHLY.

Fotografisk Tidskrift for Frackmän ook Amatören. Albin Roosval, Kolmar.

RUSSIAN.—MONTHLY.

Photographitscheski Westnik. Editor, Paul Olchin; Publishers, B. Saenger & Co., St. Petersburg.

Monthly Record of the Photographic Section Imperial Russian Technical Society. No. 2 Pantelemonskaja, St. Petersburg.

ITALIAN.—MONTHLY.

La Camara Oscura. G. Salvi, Prato, presso Firenze.

Revista Fotografica Universale, Brindisi. (Irregular.)

Boletino dell Assoceazione Degli Amatori di Fotografia in Roma. Vio Poli, 25.

SPANISH.—MONTHLY.

Boletin Fotografico. J. L. Lopez & Co., Box 213, Havana, Cuba.

Revista Fotografica Española y Estrangera. Gibraltar.

La Fotografia. Barcelona.

PORTUGUESE.

A Arte Photographica. Cirne & Co., Rue da Picaria, Oporto, Portugal.

Boletin da Academia Portugueza de Amadores Photographicas.

HUNGARIAN. (Magyar.)

Fényképészeti Kozlony. Monthly. Edited by A. Halász. Published by the Association of Photographers' Assistants. Buda-Pesth.

JAPANESE.

Sashin Shimpo (*Photographic News*). Edited by W. K. Burton. Tokio, Japan.

PHOTOGRAPHIC BOOKS PUBLISHED IN 1889-90.

AMERICAN.

The American Annual of Photography and Photographic Times Almanac for 1889. C. W. Canfield, Editor. New York: Scovill & Adams Company.

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STANDARD FORMULÆ AND USEFUL RECIPES.

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THE WET COLLODION PROCESS.

1.—Negative Collodion.

Ether	½ ounce
Absolute alcohol	½ ounce
Pyroxyline	5 grains
Iodide ammonium	5 grains
Bromide of cadmium	2 grains

2.—Negative Collodion.

Plain Collodion

Alcohol	5 ounces
Ether	10 ounces
Pyroxyline	100 grains

Sensitizer.

Alcohol	5 ounces
Iodide ammonium	60 grains
Iodide cadmium	30 grains
Bromide cadmium	20 grains

After being perfectly dissolved, mix.

3.—Ferrotype Collodion (Estabrooke's).

Iodide of ammonium	30 grains
Iodide of sodium	10 grains
Iodide of cadmium	20 grains
Bromide of cadmium	20 grains
Ether and alcohol (of each)	5 ounces
Pyroxyline, sufficient quantity, say 25 grains.	

4.—Collodion for the Reproduction of Line Work (Volkmer's).

Plain Collodion.

Ether	500 grams
Alcohol	400 grams
Pyroxyline	16 grams

Sensitizer.

Chloride of calcium	1.6 grams
Iodide ammonium	4.7 grams
Iodide cadmium	7 8 grams
Absolute alcohol	100.0 grams

After being perfectly dissolved, mix.

5.—Silver Bath for Wet-Plates.

Nitrate of silver	1 ounce
Distilled water	10 ounces

Iodize and acidulate with nitric acid.

6.—Silver Bath for Wet-Plates (Liesegang's).

Distilled water	150 c.c.m.
Nitrate of silver	10 grams

If the bath fogs add a few drops of iodine solution (1 part iodine to 10 parts alcohol).

7.—Silver Bath for Line Work.

Water	1 litre
Nitrate of silver	100 grams
Nitric acid, c. p., a few minims, to acid reaction.	

To 1 litre of bath add 20 c.c.m. of the following solution:

Iodide potassium	6 grams
Iodine	1 gram
Water	500 c.c.m.

8.—SILVER BATH FOR FERROTYPES (ESTABROOKE'S).

Water	64 ounces
Nitrate of silver	4 ounces
Iodide potassium	2 grains

Dissolve, sun for three or four hours, filter and acidulate.

9.—DEVELOPER FOR FERROTYPES, BY E. P. GRISWOLD.

Water	64 ounces
Protosulphate of iron and ammonia	4 ounces
Acetic acid, No. 8	4 ounces
Yellow rock candy	½ ounce

10.—DEVELOPER FOR WET-PLATES.

Sulphate of iron and ammonia	1 ounce
Acetic acid	1½ ounce
Water	16 ounces

11.—DEVELOPER FOR HARD NEGATIVES (LINE WORK), WET-PLATES.

Water	100 c c.m.
Protosulphate of iron	5 grams
Tartaric acid	1 gram

12.—DEVELOPER FOR WET-PLATES (VERY INTENSE).

Water	1000 c c.m.
Protosulphate of iron	36 grams
Sulphate of copper	12 grams
Glacial acetic acid	50 c.c.m.
Alcohol	40 c.c.m.

13.—DEVELOPER FOR WET-PLATES.

Protosulphate of iron	1 ounce
Acetic acid	1 ounce
Water	16 ounces

14.—INTENSIFIER FOR WET-PLATES.

Saturated solution of protosulphate of iron	20 c.c.m.
Acetic acid	10 c.c.m.
Citric acid	5 grams
Water	200 grams
And silver solution to suit.	

15.—INTENSIFIER FOR WET-PLATES.

Pyrogallic acid	1 gram
Citric acid	3 grams
Water	80 c.c.m.
And silver solution to suit.	

16.—INTENSIFIER FOR LINE WORK, WET-PLATES.

A.—Bromide of potassium	½ ounce
Water	4 ounces
B.—Sulphate of copper	½ ounce
Water	4 ounces

Mix equal parts of A and B and pour on the film. When perfectly whitened, blacken with solution of nitrate of silver, 30 grains to the ounce. For greater intensity, use hydrosulphate of ammonia solution, 1 part in 4 parts of water, after the bromide of copper, and thorough washing.

17.—INTENSIFIER FOR WET-PLATES.

Red prussiate of potash	2 drams
Nitrate of lead	3 drams
Water	12 ounces

Immerse the fixed negative till thoroughly whitened; wash, and flood with solution of hydrosulphate of ammonia (see No. 19).

18.—INTENSIFIER FOR WET-PLATES.

Water	1 litre
Red prussiate of potash	50 grams
Nitrate of uranium	50 grams
Sugar	50 grams
Sulphuric acid	30 minims

19.—To Strip Collodion Negatives.

The best way to do this is to coat the negative, when dry, with a solution of pure rubber in benzole, and afterwards with leather collodion. When perfectly dry, the edges of the negatives may be cut in, and the plate immersed in a diluted acetic acid solution 1:10. After a short time the film loosens, and may easily be detached from the plate, and turned.

20.—To Rectify a Negative Silverbath.

Dissolve one part of permanganate of potassium in hundred parts of water and add drop by drop so much of this solution to the bath impregnated with organic matter, till after vigorously shaking a slight pinkish color remains.

Sun for several hours, filter and test for neutrality. Acidify with nitric acid.

DRY COLLODION PROCESSES.

21.—Collodio-Bromide Emulsion.

Ether, sp. g.: .720	5 fluid ozs
Alcohol, sp. g.: 820	3 fluid ozs
Pyroxyline	50 grains
Bromide of cadmium and ammonium	80 grains
(or bromide of zinc	76 grains)

Sensitize by adding to each ounce 15 grains of nitrate of silver, dissolved in a few drops of water and one dram of boiling alcohol. This is suitable for slow landscape work or transparencies.

22.—Washed Emulsion.

Ether, sp. g. .720	4 fluid ozs
Alcohol, sp. g. .820	2¾ fluid ozs
Pyroxyline	40 grains
Castile soap dissolved in alcohol	30 grains
Bromide of ammon. and cadmium	84 grains

Sensitize with 100 grains of nitrate of silver dissolved in 1 ounce of boiling alcohol, and after standing ten days, add 20 grains more of silver, dissolved in 2 drams of alcohol.

For greater rapidity, use ¼ oz. more alcohol, and add at first only 54 grains of the double bromide of ammonium and cadmium; sensitize with 125 grains of nitrate of silver, dissolved as before in one ounce of boiling alcohol. In twelve hours' time add 30 grains more of the double bromide of ammonium and cadmium, dissolved in half an ounce of alcohol, and wash.

23.—Washed Emulsion for Transparencies.

Ether, sp. g. .720	5 fluid ounces
Alcohol, sp. g. .820	3 fluid ounces
Pyroxyline	60 grains
Bromide of cadmium and ammonium	100 grains
(or bromide of zinc	90 grains)
Hydrochloric acid, sp. g. 1.2	8 minims

Sensitize with 20 grains of nitrate of silver to the ounce, dissolved in a minimum of water with 2 drams of boiling alcohol. Allow to stand for two or three days.

The emulsion, after being allowed to ripen, should be poured into a dish and set aside to become thoroughly dry. The mass of dry emulsion is then washed, to remove all soluble salts, and is then again dried and re-dissolved in equal parts of ether and alcohol, at the rate of from 20 to 24 grains to the ounce of the solvents.

24.—DEVELOPER FOR COLLODION EMULSION.

A.—Pyrogallol	96 grains
Alcohol	1 fluid ounce
B.—Bromide of potassium	10 grains
Water	1 fluid ounce
C.—Liquor ammonia, sp. g. .880	1 fluid dram
Water	15 fluid drams
or,	
D.—Carbonate of ammonium	2 grains
Water	1 fluid ounce

For each dram of developer take for a normal exposure 5 minims of A, 1 or 2 minims of B, and 1 or 2 minims of C, or if D be used, add the above quantities of A, B and C to 1 dram of D. When the details of the image are out, add double the quantity of B and C.

25.—INTENSIFIER FOR COLLODION EMULSION NEGATIVES.

Nitrate of silver	60 grains
Citric acid	30 grains
Nitric acid	30 minims
Water	2 ounces

To each dram of a solution of pyrogallol, three grains to the ounce, add 2 or 3 minims of the above, and apply until sufficient density is secured.

ALBUMEN PROCESSES.

26.—GOBERT'S ALBUMEN PROCESS.

Albumen from fresh eggs	26 drams
Iodide of ammonium	15 grains
Bromide of potassium	4 grains
Iodine in pellets	4 grains

Sensitize in

Distilled water	4 ounces
Nitrate of silver	155 grains
Glacial acetic acid	2½ drams

Albumen plates are developed with saturated solution of gallic acid with a few drops of aceto-nitrate of silver solution (1 to 30).

27.—WHIPPLE & BLACK'S ALBUMEN HONEY PROCESS.

Albumen	8 ounces
Honey	7 ounces
Iodide of potassium	3 drams
Bromide of potassium	20 grains
Chloride of sodium	10 grains
Water	2 ounces

Sensitize in bath of the following proportions—

Nitrate of silver	1 ounce
Water	10 ounces
Acetic acid	8 to 10 drams

For development, see above (No. 26).

GELATINE DRY-PLATE PROCESSES.

28.—W. K. BURTON'S GELATINE EMULSION.

A.—Bromide of ammonium	260 grains
Iodide of potassium	20 grains
Gelatine (Nelson, No. 1)	80 grains
Distilled water	10 ounces
B.—Silver nitrate (dry)	200 grains
C.—Silver nitrate	200 grains
Distilled water	1 ounce

Converted to ammonia-nitrate.

D.—Gelatine, hard (dry)	600 grains

For detailed directions for making the emulsion, see PHOTOGRAPHIC TIMES, Vol. XVII, page 285.

29.—Burbank's Gelatine Emulsion.

Water	1 ounce
Bromide of ammonium	15 to 20 grains
or,	
Bromide of potassium	18 to 25 grains
Nitrate of silver, proportioned to the amount of bromide	25 to 30 grains
Gelatine	30 to 40 grains

See Burbank's "The Photographic Negative," pages 87–109.

30.—Henderson's Gelatine Emulsion by Ammonia Method.

In distilled water	8½ ounces
dissolve	
Bromide of ammonium	308 grains
Gelatine (previously swelled)	50 grains
When cold add	
Water	1¾ ounces
Alcohol	1¾ ounces
Stronger ammonia	½ ounce
In distilled water	3½ ounces
dissolve by heat	
Nitrate of silver	462 grains

and add gradually to the gelatine solution. Ripening for twenty-four hours gives sensitiveness to the emulsion. Add, finally, 220 grains of swelled gelatine.

31.—George W. Fowler's Gelatine Emulsion.

A.—Bromide of potassium	84 grains
Iodide of potassium	4 grains
Muriatic acid	1 drop
Gelatine	36 grains
Distilled water	4 ounces
B.—Nitrate silver	108 grains
Distilled water	2 ounces
C.—Gelatine (hard)	100 grains

Water to cover, used merely to soften the gelatine.

32.—Dr. J. M. Eder's Gelatine Emulsion with Ammonio-Nitrate of Silver.

In distilled water, 10 ounces, dissolve bromide of potassium, 370 grains; add gelatine, 617 grains, previously swelled in water. In distilled water, 10 ounces, dissolve nitrate of silver, 462 grains.

To this solution, cold, add stronger ammonia, drop by drop, until the precipitate first formed is re-dissolved. Add this gradually to the first solution, and place in a water bath at a temperature of 105 deg. Fahr., for 30 to 45 minutes. Then remove the source of heat, and allow the emulsion to cool down gradually to about 75 deg. Fahr., then pour out to set, and proceed as usual.

DEVELOPING FORMULÆ FOR GELATINE DRY-PLATES.

33.—Soda-Potash Developer for Gelatine Dry-Plates.—J. Carbutt.

A.—Distilled or ice water	10 ounces
Sulphite of soda crystals	4 ounces

Dissolve and add slowly

Sulphuric acid	1 dram
Pyrogallol	1 ounce
Water to make up to 16 fluid ounces.	
B.—Water	10 ounces
Carbon. of potass., ch. pure	2 ounces
Carbon. of soda, granulated	2 ounces

N. B.—During summer add thirty grains of bromide of potassium to A; for portraits or instantaneous work, to four ounces of water add three

drams of A and two drams of B. More of B to be added if under-exposed, and more of A, with a few drops of a 10 per cent. solution of bromide of potassium, if over-exposed.

34.—CARBUTT'S IMPROVED DEVELOPER FOR TRANSPARENCIES.

A.	Oxalate of potash	8 ounces
	Water	30 ounces
	Citric acid	60 grains
	Citrate of ammonia solution	2 ounces
B.	Sulphate of iron	4 ounces
	Water	32 ounces
	Sulphuric acid	16 drops
C.	Citrate of ammonia solution.	

Dissolve one ounce citric acid in five ounces distilled water, add liquor ammonia until a slip of litmus paper just loses the red color, then add water to make the whole measure eight ounces.

Developer.—Add one ounce of B to two of A, and one-half ounce of water, and three to six drops of bromide solution.

Let the development continue until the blacks look quite strong, and detail plainly showing in the high lights; wash off developer thoroughly before fixing, use fresh hypo solution, when fully cleared, wash for half hour, then immerse five minutes in the hardening solution given below; afterwards wash for half hour, then carefully go over surface with soft camel's-hair brush, or pledget of cotton, to remove any particles of dirt; place in rack to dry. Then varnish with plain collodion:

Collodion Varnish.

Alcohol	4 ounces
Pyroxyline	30 to 40 grains
Sulphuric ether	4 ounces

When, after shaking, the cotton is dissolved, filter and flow the plain collodion over the dry transparency, the same as when using varnish; when dry, cover with matt and a crystal cover glass, and bind with binding strip.

Hardening and Clearing Solution.

Water	36 ounces
Chrome alum	½ ounce
Citric acid	½ ounce

Three to five minutes, then wash and place in the

Fixing Solution.

Hyposulphite of soda	8 ounces
Water	40 ounces

35.—SODA DEVELOPER FOR GELATINE DRY-PLATES (CARBUTT'S "ECLIPSE" FORMULA).

No. 1 Pyro Stock Solution.

A.	Distilled or ice-water	10 ounces
	Sulphuric acid	1 dram
	Sulphite of soda crystals	4 ounces

Then add Schering's pyro, one ounce, and water to make sixteen fluid ounces.

No. 2 Stock Soda Solution.

B.	Water	10 ounces
	Sulphite of soda crystals	2 ounces
	Carbonate of soda crystals (or dry granular, one ounce)	2 ounces
	Potash carbonate	1 ounce

Dissolve and add water to make measure sixteen fluid ounces.

For large galleries, dilute with water to proportion of ten ounces of No. 2 to seventy ounces of water to make eighty fluid ounces for winter use, testing 5 deg. Beaumé, and to 100 to 120 fluid ounces for summer testing 3½ deg. to 4 deg. Beaumé and label "Dilute Soda Solution."

No. 3 Bromide Solution.

C.—Bromide of sodium or potassium	½ ounce
Water	5 ounces

Developer.—Dilute sufficient of B to meet the requirement for the day's work, or the number of plates to be developed, by adding eight ounces of water to two ounces of stock B. To three ounces of dilute B, add 1½ to 2½ drams of A. The more pyro the denser the negative, and *vice versa.* One and one-half dram A to above quantity of B dilute, has been found to yield portrait negatives of perfect quality and quick printers. If restraining becomes necessary, use a few drops of No. 3. No yellowing or fogging need be apprehended, if directions are followed. After developing, wash and immerse negatives in the

Hardening and Clearing Bath.

Chrome alum	½ ounce
Citric acid	¼ ounce
Water	36 ounces

for not less than two minutes, wash under tap and place in

Fixing-Bath.

Hyposulphite of soda	8 ounces
Water	40 ounces

The weight used in this formula is the avoirdupois ounce of 437½ grains.

36.—Manipulation of Carbutt's Flexible Films.

First lay film in water in tray for half a minute or so, then develop, fix, and wash precisely as for glass dry plates; after washing, lay for five minutes in water 25 ounces, glycerine 1 ounce, pass rapidly through clear water, then hang up by spring clip to dry.

37.—Formulæ and Directions for Working the Cramer Plate of High Sensitiveness.

Alkaline Solution.

Sulphite of sodium crystals	6 ounces
Carbonate of sodium crystals (sal soda)	1½ ounces
Water	64 ounces

The alkaline solution, as well as the sulphite of sodium, must be kept in well-stoppered bottles. If old and decomposed it will cause yellow stains.

If dried or granular sulphite of sodium is used, 3 ounces will be found equal to 6 ounces crystals.

Twelve drams carbonate of sodium crystals (sal soda) are equivalent to 5 drams carbonate of sodium dried or 6 drams carbonate of potassium.

Pyro Solution.

Distilled or pure ice-water	6 ounces
Sulphuric acid	15 minims
Sulphite of sodium crystals	1 dram

After this is dissolved add

Pyrogallic acid	1 ounce

The solution should have a bright yellow color and smell like burning sulphur, owing to the liberation of sulphurous acid, which preserves the pyro.

Developer.—During cold weather use 8 ounces alkaline solution and 2 to 5 drams pyro solution; keep moderately warm (about 70 degrees Fahrenheit).

In hot weather add to 4 ounces alkaline solution, 6 ounces cold water and from 2 to 4 drams pyro solution, and keep it cool (below 60 degrees Fahrenheit).

Negative by A. Peebles Smith, New York. N. Y. Eng. & Printing Co.

Developer which is too warm or contains too much carbonate of soda or potassium will work foggy.

Three drams pyro solution will generally be found sufficient for 8 ounces developer to produce good intensity if the plates are not over-exposed and if the development is carried on far enough.

The developer can be used repeatedly.

When fresh it answers best for short exposures.

After having been used once or twice it will work with more contrast and clearness. Therefore it is well to add a little old developer to the new. For over-exposed plates old developer should be used, and if much over-exposed, restrain by adding to the developer a few drops of bromide solution (1 ounce bromide of potassium to 10 ounces of water).

An under-exposed plate should be treated with diluted developer, weak in pyro, for instance: 4 ounces alkaline solution, 1 dram pyro solution and 8 ounces of water; use plenty of solution, keep it cool and change it several times if the exposure has been so short as to require prolonged development.

Fixing Bath.

Hyposulphite of soda	1 pound
Water	1 gallon

Do not expose the plate to light before it is fixed, and leave it in the bath a few minutes longer than apparently necessary, to insure thorough fixing.

To prevent yellow staining of negatives it is of the utmost importance to renew the hypo bath as soon as the solution turns dark.

After fixing place the negative in dish containing cold alum solution. Let it remain about fifteen minutes to harden the film, then wash thoroughly.

In hot weather, when there is danger of frilling or softening of the film, use the following:

Fixing Bath for Hot Weather.

Dissolve

Hyposulphite of soda	2 pounds
Bicarbonate of soda	½ pound
Powdered alum	2 pounds

in 2 gallons of water.

Allow to stand a couple of days until settled, then decant the clear solution for use. This bath will fix somewhat slower than the plain hypo bath, but will produce very clear negatives and will harden the film so thoroughly as to allow subsequent washing without the use of ice. It should be used in tropical climates.

38.—Potash Developer for Gelatine Dry-Plates (Beach's Formula).

A.—*Pyro Solution.*

Warm distilled water	2 ounces
Sulphite of soda	2 ounces

Dissolve, and when cold add

Sulphurous acid	2 ounces
Pyrogallol	½ ounce

B.—*Potash Solution.*

1.—Water	4 ounces
Carbonate potash, c. p.	3 ounces
2.—Water	3 ounces
Sulphite soda	2 ounces

Combine 1 and 2 into one solution.

For a shutter exposure take three ounces water, half ounce A, and three drams B, increasing the latter to five drams if the image hangs back

For over-exposure, three ounces water, three drams A, one dram B, adding more if necessary.

39.—POTASH DEVELOPER FOR GELATINE DRY-PLATES (DR. STOLZE'S).

Modified bv Dr. Eder.

A.—	Water	200 c.c.m.
	Carbon of potass, c. p.	90 grams
	Sulphite of soda	25 grams
B.—	Water	100 c.c.m.
	Sulphite of soda	25 grams
	Pyrogallol	12 grams

Mix 40 minims of A with 50 minims of B and 100 c.c.m. of water.

Bromide of potassium should be used only in minimal quantities, one to three minims (of a ten per cent. solution); with more, the general sensitiveness is much reduced.

An alum bath mixed with an equal volume of saturated sulphate of iron solution increases the density, and gives the plate a good printing quality.

40.—DEVELOPER WITH SULPHITE OF AMMONIUM, FOR GELATINE DRY-PLATES.

A.—	Water	350 c.c.m.
	Sulphite of ammon	70 grams
	Pyrogallol	25 grams
B.—	Water	250 c.c.m.
	Bromide of ammon	8 grams
	Ammonia	80 c.c.m.

Take 1 c.c.m. of each and 35 c.c.m. of water.

41.—POTASH DEVELOPER FOR "HARVARD" DRY-PLATES.

A.—	Distilled water	12 ounces
	Sulphite of soda (crystals)	2 ounces
	Citric acid	60 grains
	Bromide of ammonium	25 grains
	Pyrogallic acid	1 ounce

Dissolve separately, mix in order named and filter.

B.—	Distilled water	12 ounces
	Sulphite of soda (crystals)	2 ounces
	Carbonate of potash	4 ounces

Dissolve separately, mix and filter.

The stock solutions must be kept in well stoppered bottles, The pyro stock solution will remain clear and in good order for about a month. It should not be used after it has turned dark and muddy from age.

To develop, mix A, one dram; B, one dram; water, two ounces. For detail, add more water; for contrast, more A; for density, more of each A and B. For instantaneous or short exposures use double the quantity of water (4 oz.) to begin with, pour off when about half developed and finish with developer, full strength.

After development, and before fixing, it is well to flow the negative with a saturate solution of alum. Rinse, and fix in the following solution:

Hyposulphite of soda	1 pound
Water	2 quarts

Many prefer to add alum to the fixing solution (about one ounce to the above), to which there is no serious objection, provided, always, it is filtered occasionally.

42.—DEVELOPER FOR IVORY FILMS.

Soda Developer.

STOCK SOLUTION.

Water	10 ounces
Sulphite Soda (Crystals)	2 ounces
Sal Soda (Crystals)	2 ounces
Bromide Potassium	30 grains

For use add to 5 ounces water, 1 ounce stock solution, 12 grains pyrogallic acid.

Ammonia Developer.

STOCK SOLUTION.

Water	4 ounces
Sulphite Soda	180 grains
Bromide potassium	180 grains
Liquor Ammonia (.880)	5 drams

For use add to 6 ounces water, 1 dram stock solution and 12 grain pyrogallic acid.

Immerse in water bebore developing,

NOTE.—Remember that pyro gives the strength, and the alkali the detail ; so that more time given the less alkali is needed.

Should the film be over-exposed, add as soon as possible to the developer a few drops of 60-grain solution bromide potassium.

43,—DEVELOPER FOR ALLEN AND ROWELL'S IVORY FILMS.

A.—	Sulphite of Soda, cryst	6 ounces
	Carbonate of soda	2½ ounces
	Water	64 ounces
B.—	Water	8 ounces
	Sulphuric acid	20 drops
	Sulphite of soda, cryst	2 ounces
	Pyrogallic acid	1 ounce

Take one ounce of A end one dram of B. Restrain with bromide of potassium.

44.—SODA-POTASH DEVELOPER FOR GELATINE DRY-PLATES (NEW YORK AMATEUR CLUB).

Ferro-cyanide potassium	1½ ounces
Carbonate of potassium	1½ ounces
Gran. carbon. of sodium	1 ounce
Cryst. sulphite sodium	2 ounces
Hot distilled water	10 ounces

45.—SODA DEVELOPER IN ONE SOLUTION FOR GELATINE DRY-PLATES (EDER'S FORMULA).

Crystal sulphite of soda	5 drams
Crystal Carbonate of soda	2½ drams

Dissolve in 2 ounces of boiled distilled water, and after having cooled down add 46 grains of pyro. Keep in well stoppered bottles, and for use dilute with 5 times its bulk of water.

46.—SODA DEVELOPER FOR GELATINE DRY-PLATES (COOPER'S FORMULA).

A.—	Sulphite of soda, cryst	6 ounces
	Distilled water	1 quart

When dissolved, add

Pyrogallol	1 ounce

B.—	Carbonate of soda, pure, cryst	4 ounces
	Water	1 quart

Take equal parts of A, B, and water. Restrain with bromide of potassium one ounce to water six ounces.

47.—FERROUS-OXALATE DEVELOPER FOR GELATINE DRY-PLATES (DR. EDER'S).

A.—Neutral oxalate potassium	200 parts
Distilled water	800 parts

Acidulate with oxalic acid.

B.—Proto-sulphate of iron, cryst	100 parts
Distilled water	300 parts
Sulphuric acid	5 minims

C.—Bromide of potassium	10 parts
Distilled water	100 parts

D.—Hyposulphite of soda	2 parts
Distilled water	200 parts

Mix immediately before use three parts of A with one part of B, and develop. Restrain with a few drops of C.

For over-exposure take less of the iron solution, and add gradually in small portions, as required. To give the negative body use C.

To make soft negatives with fine details, take of

A	2½ ounces
B	½ ounce
C	4 minims
D	6 minims

Plates giving with ordinary developer hard and glassy negatives, give with this modification very satisfactory results.

48.—HYDROCHINON DEVELOPER, CRAMER'S.

A.—Sulphite of soda	480 grains
Phosphate of soda	160 grains
Water	8 ounces.

Dissolve, filter, and add

Hydrochinon	100 grains
B.—Carbonate of soda	480 grains
Phosphate of soda	160 grains
Water	8 ounces

Mix equal parts of A and B.

49.—HYDROCHINON DEVELOPER, MÜLLER.

A.—Water	10 ounces
Sulphite of soda, cryst	6 drams
Carbonate of potassium	6 drams

B.—Hydrochinon	1½ drams
Water	1 ounce
Alcohol	1 ounce

Mix one ounce of A with one dram of B.

50.—HYDROCHINON DEVELOPER, WITH LIME WATER, FOR GELATINE DRY-PLATES.

Lime water	10 ounces
Sulphite of soda	¾ ounce
Sugar	½ ounce

To three ounces of this solution add four grains of hydrochinon.

51.—"CHAUTAUQUA" DEVELOPER WITH EIKONOGEN IN TWO SOLUTIONS.

A.—Eikonogen	128 grains
Crystalized sulphite of sodium	1 ounce
Dissolve in warm water	16 ounces
B—Crystallized carbonate of sodium	1½ ounce
Water	10 ounces

For normal exposures take three parts of A and one part of B. To prevent intensity add a few drops of a 10 per cent. solution of bromide of potassium.

52.—"CHAUTAUQUA" DEVELOPER WITH EIKONOGEN. (In one solution for instantaneous work.)

Eikonogen	120 grains
Crystallized sulphite of sodium	1½ ounce

Dissolve in 8 ounces of hot water and add carbonate of potassium 120 grains.

For use dilute with an equal bulk of water and add a few drops of a 10 per cent. solution of bromide of potassium.

53.—"CHAUTAUQUA" DEVELOPER, WITH AMMONIA, FOR GELATINE DRY-PLATES.

A.—Bromide ammonium	½ ounce
Water	8 ounces
B.—Aqua ammonia	1 ounce
Water	7 ounces
C.—Pyrogallol	1 dram
Nitric acid	5 minims
Water	12 ounces

Take for correct exposure of A forty minims, of B twenty minims, of C half ounce, and two ounces of water.

54.—"CHAUTAUQUA" DEVELOPER, WITH CARBONATE OF SODA, FOR GELATINE DRY-PLATES.

A.—Dissolve three ounces of granulated sulphite of soda, and one-quarter of an ounce of meta-bisulphite of potassium in thirty-two ounces of distilled water and add one ounce of pyrogallic acid.

Keep in well stoppered bottles.

B.—Dissolve eight ounces of granulated, or sixteen ounces of crystallized carbonate of soda (common washing soda) in water enough to make a bulk of thirty-two ounces.

Mix one ounce of water with one dram of A, add a few drops of B, and increase gradually till development proceeds regularly. If necessary, restrain with 10 per cent. solution of bromide of potassium.

55.—"CHAUTAUQUA" DEVELOPER, WITH CARBONATE OF POTASSIUM, FOR GELATINE DRY-PLATES.

A.—Water	12 ounces
Pyro	1 ounce
Sulphite of soda, granulated	2 ounces
Bromide potassium	80 grains
Citric acid	60 grains

B.—Water	12	ounces
Sulphite of soda, granulated	1	ounce
Carbonate of potash	3	ounces

One dram of each, A and B, to one ounce of water, makes the developing solution.

56.—FERROUS OXALATE.

For bromide prints and transfers see 47.

57.—"CHAUTAUQUA" DEVELOPER, WITH HYDROCHINON, FOR GELATINE DRY-PLATES.

A.—Hydrochinon	¼	ounce
Sulphite of soda, granulated	1	ounce
Meta-bisulphite of potassium	30	grains
Water	16	ounces
B.—Carbonate potash	1½	ounce
Water	16	ounces

Take equal parts for normal exposures. For over or under-exposures proceed as with pyro. Bromides do not restrain the action of hydrochinon.

58.—THE ACID FIXING AND CLEARING BATH.

Add 2 ounces of S. P. C. Clarifier (acid bisulphite of sodium) to 1 quart of hypo solution 1 : 5.

59.—COMBINED ALUM AND HYPO BATH.

Add saturated solution of sulphite of sodium to saturated solution of alum till the white precipitate formed remains undissolved, and when the odor of sulphurous acid becomes perceptible.

Mix this solution with an equal bulk of freshly prepared hypo solution 1 : 5 and filter.

This bath will remain clear.

60.—CLEARING SOLUTION (EDWARD'S).

Alum	1	ounce
Citric acid	1	ounce
Sulphite of iron	3	ounces
Water	20	ounces

This should be freshly mixed.

61.—CLEARING SOLUTION ("CHAUTAUQUA").

Alum	1	ounce
Citric acid	¼	ounce
Water	15	ounces

62.—BELITZKI'S METHOD TO REMOVE THE LAST TRACES OF HYPO.

Chloride of lime	20	grams
Water	1	litre

Add to the milky liquid

Sulphite of zinc	40	grams

dissolved in from 80 to 100 parts of water, shake well and decant:

The clear, supernatant solution of hypochlorite of zinc is kept in well-closed bottles; one part of it mixed with sixty parts of water will remove the last traces of fixing soda.

The solution remains active as long as it smells of hypochlorous acid.

63.—To Remove Hypo from Films.

A solution of bromine in water, of a light cherry color, destroys the hypo in a gelatine film.

64.—Intensifier, with Mercury and Ammonia, for Gelatine Dry-Plates.

Pour over the well-washed negative a saturated solution of mercuric chloride; do not keep it on too long, unless the negative is very thin. Wash well, and immerse in bath of

Water	10 ounces
Ammonia	10 minims

Leave the plate in this solution until the black color goes quite through the film. Wash well.

65.—Intensifier (Mercuric) with Sodium Sulphite, for Gelatine Dry-Plates.

Whiten the negative in a saturated solution of mercuric chloride, wash and blacken with a solution of sulphite of sodium 1 : 5. Wash well.

The reduction is perfect, with a positive black tone.

66.—Intensifier with Iodide of Mercury.

Dissolve 1 dram of bichloride of mercury in 17 ounces of water and 3 drams of iodide of potassium in 3 ounces of water, and pour the iodide solution into the mercury till the red precipitate formed is completely dissolved.

For use, dilute with water, flow over the negative till the proper density is reached and wash, when the deposit will turn yellow. Remove the yellow color by flowing a 5 per cent. solution of hypo over the plate, and give it the final washing.

67.—Intensifier for Gelatine Dry-Plates with Mercuric Chloride and Hydrochinon (Dr. Mallman).

After whitening in the saturated solution of mercuric chloride, as usual, treat with an old hydrochinon developer; the result is a bluish-black intensification, which is applicable to positives as well as negatives.

68.—Intensifier, with Cyanide of Silver, for Gelatine Dry-Plates.

Mr. J. E. Thompson gives the following: After fixing and washing the plate well, place it in a solution of

Bichloride of mercury	10 grains
Chloride of ammonium	10 grains
Water	1 ounce

for a few seconds, until it bleaches. Then wash and place in a bath of cyanide of silver until it blackens, made as follows:

Cyanide of potassium	2 ounces
Distilled water	48 ounces
Nitrate of silver	1 ounce
Distilled water	6 ounces

Pour the silver gradually into the cyanide, stirring with a glass rod. The quantities given are about right to form a precipitate which will redissolve afterwards. To be used when a few days old.

69.—Dr. Eder's Collodion Intensifier Modified for Gelatine Films. By E. Vogel, Jr.

The compound recommended is as follows:

Nitrate of lead	2 drams
Ferricyanide of potassium	3 drams
Water	12½ ounces
Glacial acetic acid	1 to 1½ ounces

The negative deposit assumes in this bath the well-known grayish-white color. To darken it the plate must first be washed for a reasonable time in pure water, and then treated in various ways according to the character of the negative.

For half-tone negatives the gray deposit may first be rendered blue by immersing the plates in a solution of ferric-chloride, which color gives place to a brownish-yellow when immersed in dilute ammonia.

To reproductions in lines a high density is given with permanganate of potassium, or by chromate of potassium, with ammonia cupric chloride, etc.

With permanganate a dark-brown is obtained. With bichromate of potassium and ammonia the plate turns yellowish-red, and with cupric chloride browish-red.

70.—Intensification of Gelatine Dry-Plates with Uranium,

The washed plate should be flooded with a one per cent. solution of uranium nitrate, which should be allowed to remain on the plate for about half a minute or so, and then poured back into the measure, into which a few drops of a two per cent solution of potassium ferricyanide has previously been added. The mixed solution are then poured over the plate, and if sufficient intensity is not obtained, more potassium ferricyanide may be added.

Add a few minims of glacial acetic acid.

71.—Reducer for Gelatine Dry-Plate Negatives (Farmer's).

Sat. sol. of ferricyanide of potassium	1 part
Hyposulphite of soda solution, 1.5	10 parts

72.—Reducer for Gelatine Dry-Plates (J. Bartlett's).

Perchloride of iron	30 grains
Citric acid	60 grains
Water	1 pint

73.—Reducer with Bichromate, for Gelatine Dry-Plates.

Bichromate of potassium	10 grains
Hydrochloric acid	10 minims
Water	1 ounce

74.—Belitski's Acid Ferri-Oxalate Reducer for Gelatine Plates.

Water	7 ounces
Potassium ferric oxalate	2¼ drams
Crystallized neutral sulphite of sodium	2 drams
Powdered oxalic acid, from	30 to 45 grains
Hyposulphite of soda	1½ ounces

The solution must be made in this order, filtered, and be kept in tightly-closed bottles ; and as under the influence of light the ferric salt is reduced to ferrous, the preparation must be kept in subdued light.

75.—To Reduce Intensity of Negatives.

Rub the parts to be reduced with a soft rag moistened with alcohol, till

the density is softened down. For sharply defined outlines use a pointed stick of soft wood dipped in alcohol.

The method may be well applied for the brightening up of flare spots and halation marks.

ORTHOCHROMATIC METHODS BY BATHING.

76.—Orthochromatic Dry-Plates—F. Ives' Chlorophyll and Eosine Process.

Use any good bromide collodion emulsion that contains no free nitrate of silver. Flow plate as usual, and as soon as the emulsion film sets, flow several times with strong alcoholic solution of chlorophyll from blue myrtle, or plantain leaves, then immerse in water strongly tinted with blue shade eosine, and keep in motion until smooth.

Sensitizes for all colors, including deep ruby red ; a very light-yellow screen is sufficient to secure correct rendering of color-tone.

77.—Orthochromatic Dry-Plates—V. Schumann's Cyanine Bath.

Soak the plate in 200 c.c.m. of water and 2 to 4 c.c.m. of ammonia for two to three minutes, then immerse in

Distilled water	200 c.c.m
Alcohol	10 c.c.m
Ammonia	4 c.c.m
Alcoholic solution of cyanine, 1:500	10 c.c.m

78.—Orthochromatic Dry-Plates—Drs. Mallmann and Scolik's Erythrosine Bath.

Preliminary Bath.

A.—Water	200 c.c.m
Ammonia	2 c.c.m

Soak the plate for two minutes.

Color Bath.

Erythosine solution, 1.1000	25 c.c.m
Ammonia	4 c.c.m
Water	175 c.c.m

The plate should not remain longer in this bath than one and a quarter minutes. A longer time depresses the general sensitiveness.

79.—Orthochromatic Dry-Plates—Standard Chinoline Solution—Drs. Mallmann and Scolik.

Alcohol	500 c.c.m
Chinoline red	1 gram

To which are added 50 c.c.m. of a solution of

Alcohol	500 c.c.m
Chinoline blue (cyanine)	1 gram

The above solution is identical with the liquid dye sold under the name "Azaline."

80.—Orthochromatic Dry-Plates, "Chautauqua" Chinoline Bath.

Soak the plate, the emulsion of which should contain but little iodide of silver, for 150 seconds in

Water	6 ounces
Ammonia	30 drops

And color in

Standard chinoline solution	2 drams
Water	32 ounces
Ammonia	1 dram

81.—Obernetter's Method with Nitrate of Silver.

Distilled water	480 c.c.m.=14 ounces 1½ dram
Nitrate of silver	1.25 grams=20 grains
Ammonium carbonate	5 grams=1 dr. 11 grains
Erythrosine solution (1:500)	35 c.c. m=1¼ ounce
Aqua ammonia	4 c.c.m.=1 dr. 8 minims

Bathe the plate in the preliminary solution (see No. 78) for 150 seconds. Without washing flow the sensitizing solution over the plate twice, and dry in the dark closet.

82.—To Prepare Yellow Glass Screens.

Take of crushed (not powdered) curcuma root two ounces, and macerate in ten ounces of alcohol for three days. After filtering the tincture, mix with an equal bulk of ether, and add to each ounce of the mixture six grains of gun cotton.

With this collodion coat a plane parallel glass plate, which must be perfectly white, thin, and without any curvature.

VARNISHES.

83.—Negative Varnish.

Sandarac	4 ounces
Alcohol	24 ounces
Oil of lavender	3 ounces
Chloroform	5 drams

84.—Negative Varnish.

White hard varnish (see No. 85)	15 ounces
Alcohol	25 ounces

This will be found a good and cheap varnish if durability is not required, as it is easily rubbed up for retouching upon and easily cleaned off. Very suitable for enlarged negatives that are not to be retained.

85.—Negative Varnish.

Tough, hard and durable.

Shellac	1½ ounces
Mastic	½ ounce
Oil of turpentine	½ ounce
Sandarac	2½ ounces
Venice turpentine	½ ounce
Camphor	20 grains
Alcohol	20 fluid ounces.

86.—Negative Varnish.

Sandarac	90 ounces
Turpentine	36 ounces
Oil of lavender	10 ounces
Alcohol	500 ounces

87.—Standard Photographic Varnish.

White shellac	8 ounces
Orange shellac	4 ounces
Sandarac	1 ounce
Alcohol	60 ounces

88.—Retouching Medium.

Gum Damar	70 grains
Yellow resin	6 drams
Spirits of turpentine	4 ounces

89.—Negative Retouching Varnish.

Sandarac	1 ounce
Castor oil	80 grains
Alcohol	6 ounces

First dissolve the sandarac in the alcohol, and then add the oil.

90.—GROUND-GLASS VARNISH.

Sandarac	90 grains
Mastic	20 grains
Ether	2 ounces
Benzole	½ to 1½ ounces

The proportion of the benzole added determines the nature of the mat obtained.

91.—ENCAUSTIC PASTE.

Pure wax	500 parts
Gum elemi	10 parts
Benzole	200 parts
Essence of lavender	300 parts
Oil of spike	15 parts

PRINTING AND TONING ON ALBUMENIZED OR PLAIN PAPER.

92.—THE SILVER PRINTING BATH.

Silver nitrate	50 grains
Water	1 ounce

93.—MODIFIED SILVER BATH.

Silver nitrate	50 grains
Ammon. nitrate or magnesium nitrate	50 grains

To secure a neutral state of the bath a little carbonate of silver should be kept at the bottom of the stock bottle.

94.—TO MAKE SENSITIZED ALBUMEN PAPER DURABLE.

1—Sensitize in the following bath :

Nitrate of Silver	1 ounce
Citric acid	1 ounce
Alcohol	1 ounce
Water	12 ounces

or,

2.—Sensitize the paper in the usual bath, drain well, and when superficially dry float the back of the paper for 20 minutes on a solution of

Citric acid	1 ounce
Water	30 ounces

or,

3.—Sensitize as usual, drain well and wash the paper in 3 or 4 changes of water then float the back on a solution of

Nitrite of potassium	5 ounces
Water	100 ounces

When dry roll the paper up, coated side out and wrap in blotting paper soaked in the Nitrite of potash solution and dried.

95.—TONING BATH (SPAULDING'S).

Stock Solution.

Water	15 ounces
Gold chloride	15 grains

To make up a toning bath for twenty cabinet size prints, tak

Water	10 ounces
Soda bicarbonate	3 grains
Common salt	6 grains
Stock solution of gold	3 ounces

96.—THE PRICE TONING FORMULA.

Into seven and a half ounces of water dissolve fifteen grains chloride of gold and sodium, then add to it 300 grains of acetate of soda and seven drops of a saturated solution of chloride of lime.

This stock solution should be prepared at least twenty-four hours before being used. Take half ounce of it and mix with seven ounces of water.

97.—The Photographic Times Toning Bath.

Into seven and a half ounces of water put seven and a half grains chloride of gold and sodium. Lable the bottle containing the mixture: *Chloride of gold solution.* Combine six ounces of water with *one ounce of French azotate*, to which add one and a half ounces of the chloride of gold solution.

98.—The Chautauqua Toning Bath.

Dissolve fifteen grains of chloride of gold and sodium in fifteen ounces of water. Take of this solution three ounces, pour it in the toning dish, test for acidity with litmus paper, and *neutralize* with bicarbonate of soda, and add thirty grains of acetate of soda and thirty ounces of water. Prepare the solution an hour before using it.

If warm tones are wanted add a little acetic acid to the last washing water.

For this bath the sensitizing silver should be neutral, for which purpose a small portion of carbonate of silver should be kept in the silver stock bottle.

99.—Charles W. Hearn's Toning Baths.

With Sal Soda.

Distilled or ice water	64 ounces
Acid sol. of ch. of gold (4 grains to 1 ounce)	1 ounce
Saturated solution of sal soda	½ ounce

Should be prepared half hour before use.

100. *With Chloride of Lime.*

Water	40 ounces
Chloride of lime	5 grains
Chloride of gold	4 grains

If the chloride of gold is acid, it may be neutralized with carbonate of lime.

101. *With Citric Acid.*

A.—Citric acid	1 ounce
Water	20 ounces
B.—Chloride of gold	15 grains
Water	15 ounces

Stock Solution.

Take of A two and a half ounces and make slightly alkaline with saturated solution of bicarbonate of soda; of B, half ounce, and sixty-four ounces of water.

When ready to tone take sufficient of the stock solution, which should never be less than three or four days old, and add thereto one ounce of gold solution B; make alkaline with bicarbonate of soda.

102.—Toning Bath for Albumen Prints (Newcomb's).

Water	1 quart
Phosphate soda	80 grains
Cupric chloride	1 grain

One grain of chloride gold for each sheet of 18x22 paper.

The gold solution should be neutralized with chalk.

103. *With Bicarbonate of Soda.*

Chloride of gold sol. (1 grain to the ounce)	1 ounce
Water	16 ounces
Saturated sol. of bicarb. of soda	10 minims

Allow this bath to ripen for one hour. Should be made up fresh for every time toning.

104.—ABNEY AND ROBINSON'S TONING BATHS.

Gold trichloride	1 grain
Sodium carbonate	10 grains
Water	10 ounces

Should be used immediately after mixing. This bath gives purple and black tones.

105.

Gold trichloride	2 grains
Saturated sol. of chloride of lime	2 drops
Chalk	1 pinch
Water	16 ounces

The bath should be prepared with hot water, and be kept for one day before using it.

106.—SCHWIER'S BORAX TONING BATH.

Chloride of gold solution, 1:50	3 c.c.m
Borax solution, 1 to 10	100 c.c.m
Water	100 c.c.m

Can be used immediately.

107.—DR. LIESEGANG'S TONING BATH.—*With Tungstate of Soda.*

Boiling water	1 litre
Tungstate of soda	20 grams
Chloride of gold	1 gram

Can be used immediately after cooling.

108.—DR. LIESEGANG'S TONING BATH.—*With Phosphate of Soda.*

Water	1 litre
Phosphate of soda	15 grams
Chloride of gold	1 gram

109.—DR. LIESEGANG'S TONING BATH.—*With Carbonate of Lime (Chalk).*

Water	1 litre
Chloride of gold	1 gram
Carbonate of soda	15 grams
Chalk	5 grams

After twelve hours the bath is perfectly clear and colorless, when it is ready for use. It is very durable, and gives fine tones.

110.—TONING BATH FOR READY SENSITIZED PAPER.

A.—Water	1 litre
Chloride of gold	1 gram
B.—Water	1 litre
Borax	10 grams
Tungstate of soda	40 grams

111.—E. L. WILSON'S TONING BATH.

Water	32 fluid ounces
Acetate sodium	60 grains
Chloride sodium	60 grains
Chloride gold	4 grains
Nitrate uranium	4 grains

Neutralize the gold and uranium, previously dissolved in a little water, with sufficient bicarbonate soda. Before using, add gold to renew the bath, as necessary.

112.—DR. EDER'S DURABLE TONING BATH.

Take pure perchloride of gold, dissolve it in distilled water, neutralize the acidity with carbonate of lime (chalk) or carbonate of magnesia, and filter. Of this solution take as much as represents one grain of the chloride of gold, dissolved, dilute it with nine times its bulk of water, and tone. This solution will keep, when stored in the dark, and will produce good, dark, purple tones.

113.—Printing on Plain Paper.

Prepare the plain paper with

Ammonium chloride	60 to 80 grains
Sodium citrate	100 grains
Sodium chloride	20 to 30 grains
Gelatine	10 grains
Distilled water	10 ounces

or,

Ammonium chloride	100 grains
Gelatine	10 grains
Water	10 ounces

The gelatine is first swelled in cold water and then dissolved in hot water, and the remaining components of the formula are added. The solution is filtered, and when still warm the paper floated upon it for three minutes.

The salted paper is sensitized upon a neutral forty-five-grain silver bath.

114.—Red Prints for Photo-Engravers.

Citric acid	100 grains
Chloride of ammonium	100 grains
Gelatine	10 grains
Water	10 ounces

Dissolve the citric acid in a small portion of water, and exactly neutralize with carbonate of soda (228 grains of common washing soda are required).

Float the paper on this bath for one to two minutes, and sensitize upon a fifty-grain nitrate of silver solution. Fix in fresh hypo, without toning.

ARISTOTYPE OR CHLORIDE OF SILVER COLLODION PRINTING.

115.—Aristotype, or Chloride of Silver Collodion.

A.—Alcohol	100 c.c.m.
Nitrate of silver	8 grams
B.—Alcohol	100 c.c.m.
Chloride of strontium	2 grams
C.—Water	100 c.c.m.
Citric acid	5 grams
D.—Alcohol	100 c.c.m.
Ether	100 c.c.m.
Gun cotton	4 grams

To 100 c.c.m. collodion (D) add first, by constant agitation, 10 c.c.m. of B and 10 c.c.m. of C; finally add 5 c.c.m. of A by vigorously shaking the mixture. The resulting emulsion is allowed to settle for twenty-four hours, and is then used for coating paper.

116.—Chloride of Silver Collodion (Geldmacher's).

Solution 1.

Gun cotton	6¼ drams
Ether	15 ounces
Alcohol	15 ounces
Castor oil	1 dram

Solution 2.

Nitrate of silver	5 drams 8 grains
Water	6 drams
Alcohol	1½ ounces

Dissolve in a warm water bath.

Solution 3.

Citric acid	1 dram 15 grains
dissolved in	
Alcohol	2¼ ounces
and	
Chloride of strontium	1 dram 15 grains
dissolved in	
Alcohol	2¼ ounces

Make the two solutions separately and mix.

After all the solutions have been made add No. 3 to No. 1, shake vigorously, and by subdued light add gradually small portions at a time the No. 2 solution by constant agitating.

After an hour ripening the collodion emulsion is ready for use.

The paper to be coated must be furnished with a substratum of sulphate of barium and gelatine.

117.—TONING BATH FOR ARISTOTYPES.

A.—Sulpho-cyanide of ammonium	40 grams
Hyposulphite of soda	3 grams
Carbonate of soda	1 gram
Water	1½ litres
B.—Chloride of gold	2 grams
Chalk	teaspoonful
Water	1½ litres

Mix A and B in equal parts. B must be poured into A, not *vice versa*. Or

Water	1 litre
Hyposulphite of soda	120 grams
Common salt	60 grams
Chloride of gold in solution	1 gram

118.—LIESEGANG'S TONING BATH FOR ARISTOTYPES.

A.—Water	20 ounces
Sulpho cyanide of ammonium	1 ounce
Alum	1 ounce
Saturated solution of carbonate of ammonium	20 drops
B.—Water	50 ounces
Chloride of gold	15 grains

119.—A. STIEGLITZ' TONING BATH FOR ARISTOTYPES.

1. Water	32 ounces
Phosphate of soda	3 drams
2. Terchloride of gold	15 grains
Water	16 ounces

Mix. Allow to stand for twenty-four hours.

120.—LIESEGANG'S COMBINED TONING BATH.

Water	32 ounces
Hyposulphite of soda	8 ounces
Sulpho cyanide of ammonium	1 ounce
Acetate of soda	¼ ounce
Saturated solution of alum	2 ounces
and	
Water	8 ounces
Chloride of gold	15 grains
Chloride of ammonium	30 grains

Pour the gold solution into the hypo solution, then add thirty grains of freshly prepared chloride of silver.

121.—DR. STOLZE'S COMBINED TONING BATH FOR ARISTOTYPES.

Hyposulphite of soda	35	grams
Ordinary salt	9	
Alum	4	
Sulpho-cyanide of ammonium	2	
Water	150 to 200 c. c. m.	

The compound will have matured for use in four to eight days.

Decant the clear solution from the deposit formed, and filter. Immediately before use, add to above quantity, 2 c.c.m. chloride of gold solution 1:100. If the solution does not act with sufficient energy, a few c.c.m. of saturated alum solution may be added.

PRINTING ON SUBSTANCES OTHER THAN PAPER.

122.—COLLODION FOR PORCELAIN PICTURES.

Fennemore's Method.

A.—	Negative gun cotton	60 grains
	Alcohol	2 ounces
	Ether	3 ounces

Dissolve 120 grains nitrate of silver in three ounces of hot alcohol, and add by constant stirring to the above collodion.

B.—	Chloride of strontium	32 grains
	Citric acid	24 grains

Reduce to a fine powder and dissolve in four ounces of alcohol; add

Ether	4 ounces
Gun cotton	60 grains

The two collodions are to be mixed in equal proportions.

123. *Hearn's Method.*

A.—	Alcohol	7 ounces
	Ether	9 ounces
	Gun cotton	112 grains
B.—	Nitrate of silver	486 grains
	Distilled water	1 ounce
C.—	Chloride of calcium	128 grains
	Alcohol	4 ounces
D.—	Citric acid	128 grains
	Alcohol	4 ounces

Decant eight ounces of A, add sixty-four drops of B in small portions, stirring up well after every addition, and four drams of C in the same way. Finally four drams of D must be added in the same manner as the calcium solution.

124.—PRINTING ON SILK.

Boiling water	20 ounces
Chloride of ammonium	100 grains
Iceland moss	60 grains

When nearly cold, filter and immerse the silk for fifteen minutes. Sensitize for fifteen minutes in an acid 20-grain silver bath, and when dry stretch the fabric over cardboard. Print deeper than usual and tone in

Water	20 ounces
Acetate of soda	2 drams
Chloride of gold	3 grains
Common whiting	a few grains

125.—MAKING SILVER PRINTS ON WOOD.

Gelatine	45 grains
White soap	45 grains
Water	5¼ fluid ounces

Soak the gelatine in the water for five or six hours, then dissolve it with the aid of a water bath. Cut the soap into small pieces, and add to the gelatine solution, stirring the whole with a glass rod to insure a perfect mixture, then add powdered alum until the froth disappears, and strain through muslin. Cover the block with this mixture and a little zinc white, then wipe off so that a very thin film will be left, rubbing it gently, so that

Negative by Miss E. V. Clarkson. Kurtz Process.

CONTENTMENT.

the film may be of as even a thickness as possible. After drying, apply with a wide badger's-hair brush a coating of the following:

Albumen	3¼ fluid ounces
Water	2½ fluid ounces
Sal ammonia	67½ grains
Citric acid	18¾ grains

Whip the albumen to a froth, and allow it to settle; to the limpid portion add the water, then the sal ammonia, and carefully stir with a glass rod, then add the citric acid. When the block is dry, sensitize with a solution of

Water	3¼ fluid ounces
Nitrate of silver	187½ grains

Pour this upon the surface of the block, spread it evenly with a glass rod, and pour off the excess. When the block is dry, expose it under a negative in the usual manner, until it is printed the exact shade desired. When printed, immerse the printed surface in a very strong solution of salt for about three minutes. Then wash it under a stream of water for a short time, and fix it by placing it face downward in a saturated solution of hyposulphite of soda. After fixing, wash under a stream of water for about ten minutes; when dry, it is finished, and ready for the engraver.

126.—To Transfer Photographs upon Wood for Engraving.

Float the reverse side of sensitized albumen paper for fifteen minutes upon a 4 per cent. solution of bichromate of potassium, dry well, expose to light till the picture is fairly visible, place the print upon a glass plate under water until the unacted-on bichromate is dissolved out; after removal from the water, roll in with fatty ink.

When the picture is sufficiently blackened, and nearly dry, it can be transferred upon the engraver's block by rubbing it on carefully.

PRINTING WITH THE SALTS OF IRON.

127.—Cyanotypes or Blue Prints.

A.—Citrate of iron and ammonia	1⅞ ounces
Water	8 ounces
B.—Ferricyanide of potassium	1¼ ounces
Water	8 ounces

Mix equal parts immediately before use and float the paper, Rives plain, upon it for three minutes; hang up to dry.

128.—Converting Blue Prints into Brown Prints.

Blue ferro-prussiate photographic prints may be converted into brown prints by the following process:

The positive blue print, thoroughly washed and dried, is plunged into a solution of ammonia, in which it is kept until it has nearly or entirely lost its color. (The operation lasts from two to four minutes). The print is rinsed and plunged into a bath of tannic acid, the operation being stopped as soon as the desired sharpness and tone are obtained.

This last operation requires about ten minutes. If at the end of this time the color be not dark enough, it is intensified by adding to the bath a few drops of ammonia. After a lapse of one or two minutes, rinse in abundant water.

1. Solution for preparing the sensitized paper:

Tartrate of iron and potash	15 parts
Red prussiate of potash	12 parts
Rain water	250 parts

2. Solution to remove the color of the print:

Ammonia of 23 deg. Beaumé	100 parts
Rain Water	800 parts

5. Solution to give the brown tone:

Tannic acid	10 parts
Rain water	500 parts

Dissolve and filter.

129.—Toning Blue Prints.

Blue prints may be given the black tone by plunging them into a solution of four parts of potash in one hundred parts of water; then, when the blue color has entirely disappeared under the action of the potash, and a yellowish color has taken its place, they are immersed in a solution of four parts of tannin in one hundred parts of water; then washing them again we obtain prints whose tone may be assimilated to that of pale writing ink.

130.—Pellett's Method for Making Blue Lines upon White Ground.

The formula is composed as follows:

Gum arabic	385 grains
Sodium chloride	46 grains
Tartaric acid	62 grains
Perchloride of iron	123 grains
Water	3¼ ounces

Highly sized and smooth paper is evenly coated with this mixture, dried in the dark, and exposed under a negative.

Develop with a saturated solution of ferrocyanide of potassium. Fix in a one to twenty solution of hydrochloric acid.

USEFUL RECEIPTS.

131.—To Tone Bromide Prints with Platinum.—E. Vogel.

Float the print on

Potassium platino chloride	15 grains
Distilled water	32 ounces
Hydrochloric acid	2½ drams

for twenty minutes, wash and remove to a fifteen per cent. solution of copper chloride. If by this operation, vigor and depth of tone is reduced, re-develop with ferrous oxalate. The method yields warm tones.

132.—To Find the Focal Length of a Lens.—W. H. Sherman's Rule.

Make two images of any object of convenient length, so that the *difference* between the images will be equal to some even part of the object, making the position of the ground glass on the base of the camera where each image is in focus. The distance between the two positions of the

ground glass thus found, will be the same part of the focal length that the difference of the two images is of the object.

Example: With two images of a foot-rule; let one image be eight inches long and the other four inches. The difference being one third the length of the object, the distance between the two positions of the ground glass will be one-third of the focal length of the lens.

133.—To Calculate the Focal Fraction of Stops for Lenses.

Divide the focal length obtained by the above method expressed in inches and hundreths, by the diameter of stop opening expressed in hundredths of an inch.

135.—Labarraque's Solution.

Chloride of lime	2 ounces
Carbonate of soda	4 ounces
Water	40 ounces

Mix the chloride of lime with thirty ounces of the water, and dissolve the carbonate of soda in the remainder. Mix, boil and filter.

136.—Eau de Javelle.

Dry chloride of lime (hypo chloride of lime)	2 ounces
Carbonate of potash	4 ounces
Water	40 ounces

Mix the chloride of lime with half of the water; dissolve the carbonate of potash in the remainder. Mix, boil and filter.

137.—A Few Remedies Against Blistering of Albumen Paper.

Do not dry the paper by excessive heat.
Avoid acidity in solutions.
Moisten the print before washing with a sponge saturated in alcohol.
Immerse the print before fixing in a weak alum bath.
Add a trace of aqua ammonia to the fixing-bath.

138.—Matt Black Varnish.

A tolerably strong solution of sandarac in alcohol, mixed with fine lamp-black, drys without gloss, becomes hard without being brittle, and may be applied with a fine brush upon almost any substance.

139.—Invisible Ink.

Chloride of cobalt	50 grains
Distilled water	1 fluid ounce
Glycerine	10 minims

Dissolve the chloride of cobalt in the distilled water, and add the glycerine.

Writing executed with this ink is invisible on paper, but on warming the writing turns blue. On exposure to damp air, it becomes invisible again.

140.—Making Paper Adhere to Metal.

Gum tragacanth	30 grammes
Acacia gum	120 grammes
Water	500 c.c.

141.—To Precipitate Gold from Spent Sulpho-Cyanide Toning Baths.

Add sulphuric acid, and heat when the gold will separate.

142.—To Keep Unmounted Albumen Prints Flat.

Soak them in equal parts of alcohol, glycerine and water; dry between blotting paper under slight pressure.

143.—The Stripping of American Films.

From pyro-stained and presumably tanned gelatine is much facilitated by soaking the negative, after thoroughly washing, in a dilute solution of hydrochloric acid.

144.—Magic Photographs.

Fix an albumen print in perfectly fresh hypo solution and wash well, and soak it in a solution of 1 part bichloride of mercury, $\frac{1}{4}$ of a part of chloride of ammonium in 60 parts of water, till the photograph is bleached out.

The picture will appear again when brought into contact with hypo solution, or moistened blotting paper previously prepared with the fixing soda.

145.—Solution for Mounting Prints Without their Cockling.

Nelson's No. 1 photographic gelatine	4 ounces
Water	16 ounces
Glycerine	1 ounce
Alcohol	5 ounces

Dissolve the gelatine in the water, then add the glycerine, and lastly the alcohol.

146.—Permanent Paste.

Arrowroot	10 grams
Water	100 grams

in which one gram of gelatine has been soaked, and boil. After cooling add ten grams of alcohol and a few drops of carbolic acid.

147.—Leather Collodion.

2 p.c. collodion	100 parts
Castor oil	4 parts

148.—Lubricator for Hot Burnishing.

Cetaceum	10 grams
Castile soap	10 grams
Alcohol	1 kilogramme

149.—To Remove Silver Stains from the Hands.

Sulphate of soda	$\frac{1}{8}$ ounce
Chloride of lime	$\frac{1}{4}$ ounce
Water	1 ounce

Mix thoroughly, and apply with an old toothbrush.

150.—Gelatine Solution for Stripping Plates. (Carbutt's).

Water	9 ounces
Gelatine	1 ounce
Glycerine	¼ ounce

Swell the gelatine in cold water and dissolve by the heat of a water bath and filter through muslin at a temperature of 100 to 110 deg. Fahr.; flow over the well-dusted negative, using one fluid dram of the solution to each four square inches of surface. Guide to the edges of the plate with your finger, and remove air bells with a soft-pointed paper. Allow to set in horizontal position, and when perfectly dry, detach the film from the glass. Stripped films may be kept between the leaves of a book.

Plates to be stripped are, previously to coating, prepared for that purpose.

151.—To Make Transparencies on Albumen Paper.

Print on the back of heavily-silvered albumen paper till the picture is perfectly well printed out, by viewing the paper by transmitted light.

Tone and fix as usual, and, when dry, make the paper translucent with

Poppy oil	1 ounce
Balsam fir	¼ ounce
Spirits turpentine	½ ounce

152.—To Frost a Skylight.

Very thin starch paste, to which unboiled starch has been added. Must be free from lumps, and be daubed on with a large bristle brush.

153.—To Keep the Hands Soft and White.

Apply before retiring:

Glycerine	2 ounces
Bay rum	6 ounces
Oil cajeput	1 dram
Oil bergamat	1 dram

Mix well.

154.—To Remove Nitric Acid Stains from Hands or Garments.

Touch the stains with solution of permanganate of potassium; wash, rinse in dilute hydrochloride acid, and wash again.

155.—To Remove Yellow Stains from Bromide Prints.

Soak for one or two hours in

Acetic acid	2 ounces
Sat. oxalate of potassium solution	4 ounces

156.—To Remove Pyro Stains from Fingers.

Wash with a 10 per cent. solution of oxalic acid, or sulphuric acid, diluted with water (1 : 20).

157.—To Remove Yellow Stains from Pyro-Developed Negatives.

Bathe them in sulphurous acid water or in a 10 per cent. solution of sulphite of soda, to which a few drops of sulphuric acid have been added.

158.—To Remove the Odor of Hydrosulphate of Ammonia from the Dark Room.

Sprinkle the floor with a solution of nitrate of lead.

159.—To Avoid Halation.

A quick drying coating, which is applied to the back of the plate,

consists of collodion, with which any dark red or brown pigment is mixed. Spanish brown or rouge answers well.

160.—To Recover Silver Bromide from Waste Emulsion.

Let the emulsion be melted, and then add a small quantity of hydrochloric acid, following by boiling for two or three minutes. The silver bromide precipitates, and the destroyed gelatine is then poured off. The bromide is then placed among the other residues for reduction.

161.—Toning Bath for Gelatine Lantern Slides.

Chloride of platinum	1 grain
Hydrochloric acid	1 minim
Water	32 ounces

162.—Compound for Blocking out Large Portions of a Negative.

Mix asphaltum varnish with fine lamp-black and apply with a camel's-hair brush.

Should be kept in well-stoppered bottles.

163.—Flash-light Powder for Orthochromatic Plates.

Pure metallic magnesium powder	10 grains
Nitrate of soda (finely powdered)	from 50 to 70 grains

164.—Largest and Smallest Quantities of Chemicals Admitted to the Pyro Developer.

	Largest.	Smallest.
Pyro, per ounce	10 grains	1 1-4 grains
Sulphite of soda	80 grains	5 grains
Carb. of soda	40 grains	1 1-5 grains
Carb. of potash	21 2-10 grains	5 grains

165.—Consumption of Chemicals in Silver Printing on Albumenized Paper.

Of one hundred parts of silver used in the albumen printing process will be found

In the finished print	3 per cent
In filters, blotters and cuttings	7 per cent
In the wash water before toning	50 to 55 per cent
In the fixing bath	30 to 25 per cent
In the wash water after fixing	5 per cent

Ninety per cent. of the silver used may be recovered.

One sheet of paper will take from the silver bath from thirty to forty-five grains of nitrate of silver.

One sheet of paper requires to tone one and one-half grains of gold (one decigram).

About eighty to ninety grains of hyposulphite of soda are necessary to fix one sheet of paper.

UNITED STATES WEIGHTS AND MEASURES.

ACCORDING TO EXISTING STANDARDS.

LINEAL.

12 inches = 1 foot.
3 feet = 1 yard.
5.5 yards = rod.
40 rods = 1 furlong.
8 furlongs = 1 mile.

Inches.		Feet.		Yards.		Rods.		Furlong.
12								
36	=	3						
198	=	16.5	=	5.5				
7,920	=	660	=	220	=	40		
63,360	=	5,280	=	1,760	=	320	=	8

SURFACE—LAND.

144 sq. ins. = 1 sq. ft.
9 sq. ft. = 1 sq. yd.
30.25 sq.yds.= 1 sq rod.
40 sq.rods.= 1 sq.rood.
4 sq. roods = 1 acre.
640 acres 1 sq. mile.

Ft.		Yds.		Rods.		Roods.		Acres.
9	=	1						
272.25	=	30.25	=	1				
10,890	=	1,210	=	40	=	1		
43,560	=	4,840	=	160	=	4	=	1
27,878,400	=	3,097,600	=	102,400	=	2,560	=	640

VOLUME—LIQUID.

4 gills = 1 pint.
2 pints = 1 quart.
4 quarts = 1 gallon

Gills.		Pints.		Cub. In.
8				
32	=	8	=	231

FLUID.

Gallon.		Pints.		Ounces.		Drams.		Minims.		Cubic Centimetres.
1	=	8	=	128	=	1,024	=	61,440	=	3,785.441
		1	=	16	=	128	=	7,680	=	473.180
				1	=	8	=	480	=	29.574
						1	=	60	=	3.697

16 ounces, or a pint, sometimes called a pound.

TROY WEIGHT.

Pound.		Ounces.		Pennyweights.		Grains.		Grams.
1	=	12	=	240	=	5,760	=	373.25
		1	=	20	=	480	=	31.10
				1	=	24	=	1.55

APOTHECARIES' WEIGHT.

lb. Pound.		℥ Ounces.		ʒ Drams.		℈ Scruples.		gr. Grains.		Grams.
1	=	12	=	96	=	288	=	5,760	=	373.25
		1	=	8	=	24	=	480	=	31.10
				1	=	3	=	60	=	3.89
						1	=	20	=	1.30
								1	=	.06
								15½.	=	1.00

The pound, ounce, and grain are the same as in Troy weight.

AVOIRDUPOIS WEIGHT.

Pound.		Ounces.		Drams.		Grains (Troy).		Grams.
1	=	16	=	256	=	7,000	=	453.60
		1	=	16	=	437.5	=	28.35
				1	=	27.34	=	1.77

ENGLISH WEIGHTS AND MEASURES.

APOTHECARIES' WEIGHT.

SOLID MEASURE.

20 Grains	= 1 Scruple	=	20 Grains.
3 Scruples	= 1 Dram	=	60 Grains.
8 Drams	= 1 Ounce	=	480 Grains.
12 Ounces	= 1 Pound	=	5760 Grains.

FLUID.

60 Minims	= 1 Fluid Dram
8 Drams	= 1 Ounce.
20 Ounces	= 1 Pint.
8 Pints	= 1 Gallon.

The above weights are those usually adopted in formulæ.

All Chemicals are usually sold by

AVOIRDUPOIS WEIGHT.

$27\frac{11}{32}$ Grains	= 1 Dram	=	$27\frac{11}{32}$ Grains.
16 Drams	= 1 Ounce	=	$437\frac{1}{2}$ Grains.
16 Ounces	= 1 Pound	=	7000 Grains.

Precious Metals are usually sold by

TROY WEIGHT.

24 Grains	= 1 Pennyweight	=	24 Grains.
20 Pennyweights	= 1 Ounce	=	480 Grains.
12 Ounces	= 1 Pound	=	5760 Grains.

NOTE.—An ounce of metallic silver contains 480 grains, but an ounce of nitrate of silver contains only $437\frac{1}{2}$ grains.

U. S. FLUID MEASURE.

Gal.	Pints.	Ounces.	Drams.	Mins.	Cub. in.	Grains.	Cub. C. M
1 =	8 =	128 =	1,024 =	61,440 =	231. =	58,328.886 =	3,785.00
	1 =	16 =	128 =	7,680 =	28.875 =	7,291.1107 =	473.11
		1 =	8 =	480 =	1.8047 =	455.6944 =	29.57
			1 =	60 =	0.2256 =	56.9618 =	3.70

IMPERIAL BRITISH FLUID MEASURE.

Gal.	Pints.	Ounces.	Drams.	Mins.	Cub. in.	Grains.	Cub. C. M.
1 =	8 =	160 =	1,280 =	76,800 =	277.27384 =	70,000. =	4,543.487
	1 =	20 =	160 =	9,600 =	34.65923 =	8,750.	567.936
		1 =	8 =	480 =	1.73296 =	437.5 =	28.396
			1 =	60 =	0.21662 =	54.69 =	3.549

LA PHOTOGRAPHIE DANS LES ARTS LES SCIENCES ET L'INDUSTRIE. Par Albert Londe. Paris : Gauthier Villiers et Fils, 1888, 52 pp.

THE METRIC SYSTEM OF WEIGHTS AND MEASURES.

THE meter is a measure of length equal to 39.370 English inches, or 39.368 American inches, a standard of linear measure supposed to be the ten-millionth part of the distance from the equator to the north pole, as ascertained by actual measurement of an arc of the meridian.

This system, formed on the meter as the unit of length, has four other leading units, all connected with and dependent upon this. Hence, we have:

1. The meter, which is the unit of measures of length.

2. The are, which is the unit of surface, and is the square of the meter.

3. The litre, which is the unit of measures of capacity, and is the cube of a tenth part of the meter.

4. The stere, which is the unit of measures of solidity, having the capacity of a cubic meter.

5. The gram, which is the unit of measures of weight, and is the weight of that quantity of distilled water at its maximum density, fills the cube of a hundredth part of the meter.

Each unit has its decimal multiples and sub-multiples, that is weights and measures ten times larger, or ten times smaller, than the principal units. The prefixes denoting multiples are derived from the Greek, and are: Deka, ten; hecto, hundred; kilo, thousand; and myria, ten thousand. Those denoting sub-multiples are taken from the Latin, and are: Deci, ten; centi, hundred (like in centigram or centimeter); and mili, thousand.

The metric system has been adopted by many nations, the English excepted. In America its use has been made optional, but is legalized by Congress. All photographic formulæ received from the continent of Europe express values and quantities with metrical weights and measures. To utilize them direct without translating into the expressions of the English system, the student is advised to procure gram weights and cubic centimeter graduates, and substitute them for those denoting quantities according to the old plan.

As an assistance to those who cannot acquire these aids, we annex tables taken from the "British Almanac of Photography," which convert grams and cubic centimeters into English grains, drams, and ounces sufficiently correct for practical purposes.

METRIC FLUID MEASURES.

THE cubic centimeter, usually represented by "c.c.," is the unit of the metric measurement for liquids. It contains nearly seventeen minims of water; in reality, it contains 16·896 minims. The weight of this quantity of water is one gram. Hence it will be seen that the cubic centimeter and the gram bear to each other the same relation as our dram for solids and the dram for fluids, or as the minim and the grain. The following table will prove to be sufficiently accurate for photographic purposes:

METRIC SYSTEM OF WEIGHTS AND MEASURES.

MEASURES OF LENGTH.

Denominations and Values.		Equivalents in Use.	
Myriameter	10,000 meters.	6.2137	miles.
Kilometer	1,000 meters.	.62137	mile, or 3,280 ft. 10 ins.
Hectometer	100 meters.	328.	feet and 1 inch.
Dekameter	10 meters.	393.7	inches.
Meter	1 meter.	39.37	inches.
Decimeter	1-10th of a meter.	3.937	inches.
Centimeter	1-100th of a meter.	.3937	inch.
Millimeter	1-1000th of a meter.	.0394	inch.

MEASURES OF SURFACE.

Denominations and Values.		Equivalents in Use.	
Hectare	10,000 square meters.	2.471	acres.
Are	100 square meters.	119.6	square yards.
Centare	1 square meter.	1,550.	square inches.

MEASURES OF VOLUME.

Denominations and Values.			Equivalents in Use.			
Names.	No. of Liters.	Cubic Measures.	Dry Measure.		Wine Measure.	
Kiloliter or stere	1,000	1 cubic meter.	1.308	cubic yards.	264.17	gallons.
Hectoliter	100	1-10th cubic meter.	2	bu. and 3.35 pecks.	26.417	gallons.
Dekaliter	10	10 cubic decimeters.	9.08	quarts.	2.6417	gallons.
Liter	1	1 cubic decimeter.	.908	quart.	1.0567	quarts.
Deciliter	1-10	1-10th cubic decimeter.	6.1022	cubic inches.	.845	gill.
Centiliter	1-100	10 cubic centimeters.	.6102	cubic inch.	.338	fluid oz.
Milliliter	1-1000	1 cubic centimeter.	.061	cubic inch.	.27	fl. drm.

WEIGHTS.

Denominations and Values.			Equivalents in Use.	
Names.	Number of Grams.	Weight of Volume of Water at its Maximum Density.	Avoirdupois Weight.	
Millier or Tonneau	1,000,000	1 cubic meter.	2204.6	pounds.
Quintal	100,000	1 hectoliter.	220.46	pounds.
Myriagram	10,000	10 liters.	22.046	pounds.
Kilogram or Kilo	1,000	1 liter.	2.2046	pounds.
Hectogram	100	1 deciliter.	3.5274	ounces.
Dekagram	10	10 cubic centimeters.	.3527	ounce.
Gram	1	1 cubic centimeter.	15.432	grains.
Decigram	1-10	1-10th of a cubic centimeter.	1.5432	grain.
Centigram	1-100	10 cubic millimeters.	.1543	grain.
Milligram	1-1000	1 cubic millimeter.	.0154	grain.

For measuring surfaces, the square dekameter is used under the term of ARE; the hectare, or 100 ares, is equal to about two acres. *The unit of capacity* is the cubic decimeter or LITER, and the series of measures is formed in the same way as in the case of the table of lengths. The cubic meter is the unit of measure for solid bodies, and is termed STERE. *The unit of weight* is the GRAMME, which is the weight of one cubic centimeter of pure water weighed in a vacuum at the temperature of 4 deg. Cent. or 39.2 deg. Fahr., which is about its temperature of maximum density. In practice, the term cubic centimeter, abbreviated c.c., is used instead of milliliter, and cubic meter instead of kiloliter.

THE CONVERSION OF FRENCH (METRIC) INTO ENGLISH MEASURE.

1 cubic centimeter	=	17 minims.						
2 cubic centimeters	=	34 "						
3 "	=	51 "						
4 "	=	68 "	or 1 dram	8 minims.				
5 "	=	85 "	" 1 "	25 "				
6 "	=	102 "	" 1 "	42 "				
7 "	=	119 "	" 1 "	59 "				
8 "	=	136 "	" 2 drams	16 "				
9 "	=	153 "	" 2 "	33 "				
10 "	=	170 "	" 2 "	50 "				
20 "	=	340 "	" 5 "	40 "				
30 "	=	510 "	" 1 ounce	0 dram	20 minims.			
40 "	=	680 "	" 1 "	3 drams	20 "			
50 "	=	850 "	" 1 "	6 "	10 "			
60 "	=	1020 "	" 2 ounces	1 "	0 "			
70 "	=	1190 "	" 2 "	3 "	50 "			
80 "	=	1360 "	" 2 "	6 "	40 "			
90 "	=	1530 "	" 3 "	1 "	30 "			
100 "	=	1700 "	" 3 "	4 "	20 "			
1000 "	=	1 litre = 34 fluid ounces nearly, or $2\frac{1}{8}$ pints.						

THE CONVERSION OF FRENCH (METRIC) INTO ENGLISH WEIGHT.

ALTHOUGH a gram is equal to 15·4346 grains, the decimal is one which can never be used by photographers; hence in the following table it is assumed to be $15\frac{2}{5}$ grains, which is the nearest approach that can be made to *practical* accuracy:

1 gram	=	$15\frac{2}{5}$ grains.		
2 grams	=	$30\frac{4}{5}$ "		
3 "	=	$46\frac{1}{5}$ "		
4 "	=	$61\frac{3}{5}$ "	.... or 1 dram	$1\frac{3}{5}$ grain.
5 "	=	77 "	.... " 1 "	17 grains.
6 "	=	$92\frac{2}{5}$ "	.... " 1 "	$32\frac{2}{5}$ "
7 "	=	$107\frac{4}{5}$ "	.... " 1 "	$47\frac{4}{5}$ "
8 "	=	$123\frac{1}{5}$ "	.... " 2 drams	$3\frac{1}{5}$ "
9 "	=	$138\frac{3}{5}$ "	.... " 2 "	$18\frac{3}{5}$ "
10 "	=	154 "	.... " 2 "	34 "
11 "	=	$169\frac{2}{5}$ "	.... " 2 "	$49\frac{2}{5}$ "
12 "	=	$184\frac{4}{5}$ "	.... " 3 "	$4\frac{4}{5}$ "
13 "	=	$200\frac{1}{5}$ "	.... " 3 "	$20\frac{1}{5}$ "
14 "	=	$215\frac{3}{5}$ "	.... " 3 "	$35\frac{3}{5}$ "
15 "	=	231 "	.... " 3 "	51 "
16 "	=	$246\frac{2}{5}$ "	.... " 4 "	$6\frac{2}{5}$ "
17 "	=	$261\frac{4}{5}$ "	.... " 4 "	$21\frac{4}{5}$ "
18 "	=	$277\frac{1}{5}$ "	.... " 4 "	$37\frac{1}{5}$ "
19 "	=	$292\frac{3}{5}$ "	.... " 4 "	$52\frac{3}{5}$ "
20 "	=	308 "	.... " 5 "	8 "
30 "	=	462 "	.... " 7 "	42 "
40 "	=	616 "	.... " 10 "	16 "
50 "	=	770 "	.... " 12 "	50 "
60 "	=	924 "	.... " 15 "	24 "
70 "	=	1078 "	.... " 17 "	58 "
80 "	=	1232 "	.... " 20 "	32 "
90 "	=	1386 "	.... " 23 "	6 "
100 "	=	1540 "	.... " 25 "	40 "
1000 "	=	1 kilogram = 32 oz., 3 dr., 40 gr.		

TABLE SHOWING THE COMPARISON OF THE READINGS OF THERMOMETERS.

CELSIUS, OR CENTIGRADE (C). RÉAUMUR (R). FAHRENHEIT (F).

C.	R.	F.
—30	—24.0	—22.0
—25	—20.0	—13.0
—20	—16.0	— 4.0
—15	—12.0	+ 5 0
—10	— 8.0	14.0
— 5	— 4.0	23.0
— 4	— 3.2	24.8
— 3	— 2.4	26.6
— 2	— 1.6	28.4
— 1	— 0.8	30.2
Freezing point of water.		
0	0.0	32.0
1	0.8	33.8
2	1.6	35.6
3	2.4	37.4
4	3.2	39.2
5	4.0	41.0
6	4.8	42.8
7	5.6	44.6
8	6.4	46.4
9	7.2	48.2
10	8.0	50.0
11	8.8	51.8
12	9.6	53.6
13	10.4	55.4
14	11.2	57.2
15	12.0	59.0
16	12.8	60.8
17	13.6	62.6
18	14.4	64.4
19	15.2	66.2
20	16.0	68.0
21	16.8	69.8
22	17.6	71.6
23	18.4	73.4
24	19.2	75.2
25	20.0	77.0
26	20.8	78.8
27	21.6	80.6
28	22.4	82 4
29	23 2	84.2
30	24.0	86.0
31	24.8	87.8
32	25.6	89.6
33	26.4	91.4
34	27.2	93.2
35	28.0	95.0
36	28.8	96.8
37	29.6	98.6
38	30.4	100.4
39	31.2	102.2
40	32.0	104.0
41	32.8	105.8
42	33.6	107.6
43	34.4	109.4
44	35.2	111.2
45	36.0	113.0
50	40.0	122.0
55	44.0	131.0
60	48.0	140.0
65	52.0	149.0
70	56.0	158.0
75	60.0	167.0
80	64 0	176.0
85	68.0	185.0
90	72.0	194.0
95	76.0	203.0
100	80.0	212.0
Freezing point of water.		

Readings on one scale can be changed into another by the following formulæ, in which t° indicates degrees of temperature:

Réau. to Fahr.

$$\frac{9}{4}t^\circ \text{ R} + 32^\circ = t^\circ \text{ F}$$

Réau. to Cent.

$$\frac{5}{4}t^\circ \text{ R} = t^\circ \text{ C}$$

Cent. to Fahr.

$$\frac{9}{5}t^\circ \text{ C} + 32^\circ = t^\circ \text{ F}$$

Cent. to Réau.

$$\frac{4}{5}t^\circ \text{ C} = t^\circ \text{ R}$$

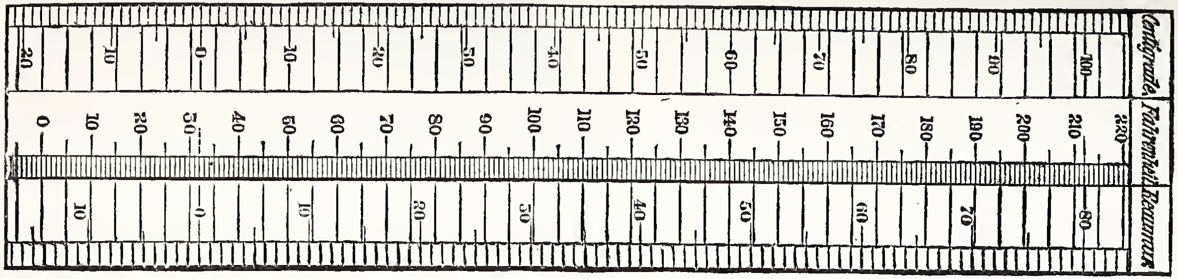
Fahr. to Cent.

$$\frac{5}{9}\left(t^\circ \text{ F} - 32^\circ\right) = t^\circ \text{ C}$$

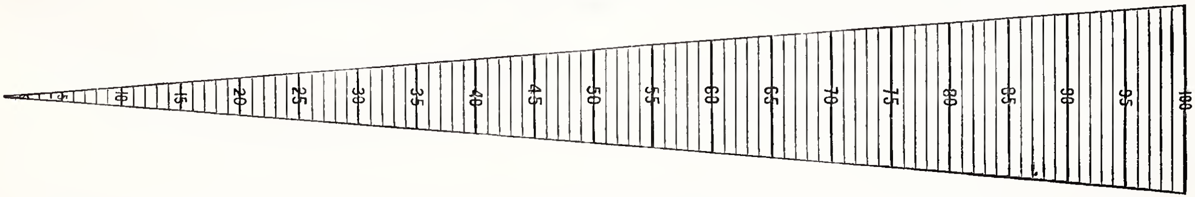
Fahr. to Réau.

$$\frac{4}{9}\left(t^\circ \text{ F} - 32\right) = t^\circ \text{ R}$$

THERMOMETER SCALES.



SCALE FOR MEASURING DIAMETERS OF STOPS FOR LENSES.

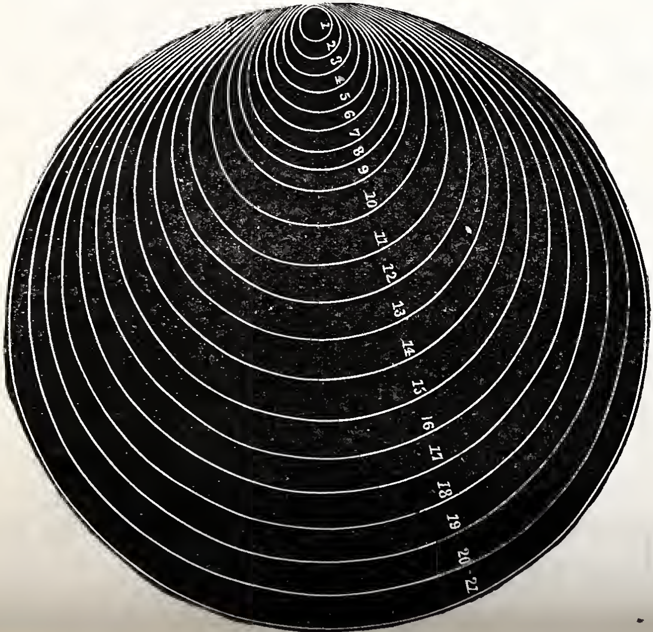


Each cross line varies in length from the adjacent one by $\frac{1}{100}$th of an inch.

To use: Lay the stop flat on this scale, and select the cross line which is of the same length as the greatest diameter of the opening; read this off, by means of the figures, which will be the measurement in $\frac{1}{100}$ths of an inch. The equivalent focal length of lens, divided by this measurement of the stop opening, will give the fraction expressing relative rapidity of lens — $\frac{f}{4}$ or whatever it may be.

THE PHOTOGRAPHIC SOCIETY'S (OF GREAT BRITAIN) STANDARD DIAPHRAGMS.

The annexed diagram and table are intended to facilitate the calculation of the proper number with which to mark the diaphragms according to the Photographic Society of Great Britain's Uniform System, which will be found described on another page. This number it is proposed to call the "U. S." (or uniform system number). The numbered circles in the diagram represent the sizes of stops. The photographer, knowing the equivalent focus of his lens, looks along the line opposite the number which represents the circle nearest inside to his diaphragm, and when he gets to the column headed by that equivalent focus the number there found is the U. S. number to be marked on the diaphragm. For example: A lens of eight inches equivalent focus has a diaphragm in size about No. 5 on the diaphragm; running the eye along the line opposite No. 5 we find in the column under—"focus eight inches" the No. 11, which is the U. S. number required.



No. of Circle.	4 focus	5 focus	6 focus	7 focus	8 focus	9 focus	10 focus	12 focus	14 focus
1	25	39	56						
2	11	17	25	34	44	56	68		
3	$6\frac{1}{4}$	10	14	19	25	31	40	56	
4	4	$6\frac{1}{4}$	9	12	16	20	25	36	48
5	$2\frac{3}{4}$	$4\frac{1}{4}$	$6\frac{1}{4}$	$8\frac{1}{2}$	11	14	17	25	34
6	2	$3\frac{1}{5}$	$4\frac{1}{2}$	$6\frac{1}{4}$	8	10	13	18	25
7	$1\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{3}{4}$	6	8	10	14	19
8	$1\frac{1}{4}$	2	$2\frac{3}{4}$	$3\frac{3}{4}$	5	$6\frac{1}{4}$	8	11	15
9	1	$1\frac{1}{2}$	$2\frac{1}{4}$	3	4	5	$6\frac{1}{4}$	9	$12\frac{1}{4}$
10		1	$1\frac{1}{2}$	$2\frac{1}{8}$	$2\frac{3}{4}$	$3\frac{1}{2}$	$4\frac{1}{3}$	6	$8\frac{1}{2}$
11			$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	$3\frac{1}{5}$	5	6
12			$\frac{7}{8}$	$1\frac{1}{5}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{3}{4}$
13				1	$1\frac{1}{4}$	$1\frac{5}{6}$	$1\frac{2}{3}$	$2\frac{3}{4}$	4
14					1	$1\frac{1}{4}$	$1\frac{1}{2}$	$2\frac{1}{4}$	3
15						1	$1\frac{1}{3}$	$1\frac{7}{8}$	$2\frac{1}{2}$
16							1	$1\frac{1}{2}$	2
17								$1\frac{1}{3}$	$7\frac{2}{3}$
18								$1\frac{1}{6}$	$1\frac{1}{2}$
19								1	$1\frac{1}{3}$
20									$1\frac{1}{5}$
21									1

Note.—This table, taken from the "British Almanac," has proved to be very convenient in the calculating of stop values.

"UNIFORM SYSTEM" NUMBERS FOR STOPS FROM $\frac{f}{1}$ TO $\frac{f}{100}$.

In the following table Mr. S. A. Warburton has calculated the exposure necessary with every stop from $\frac{f}{1}$ to $\frac{f}{100}$ compared with the unit stop of the "uniform system" of the Photographic Society of Great Britain. The figures which are underlined show in the first column what $\frac{f}{a}$ must be in order to increase the exposure in geometrical ratio from $\frac{f}{4}$, the intermediate numbers showing the uniform system number for any other aperture.

f	U. S. No.	*f*	U. S. No.	*f*	U. S. No.
1	$\frac{1}{16}$	15	14.06	58	210.25
1¼	.097	16	16	59	217.56
1.414	⅛	17	18.06	60	225.00
1½	.140	18	20.25	61	232.56
1¾	.191	19	22.56	62	240.25
2	¼	20	25.00	63	248.06
2¼	.316	21	27.56	64	256
2½	.390	22	30.25	65	264.06
2.828	½	22.62	32	66	272.25
2¾	.472	23	33.06	67	280.56
3	.562	24	36.00	68	289.00
3¼	.660	25	39.06	69	297.56
3½	.765	26	42.25	70	306.25
3¾	.878	27	45.56	71	315.06
4	1.00	28	49.00	72	324.00
4¼	1.12	29	52.56	73	333.06
4½	1.26	30	56.25	74	342.25
4¾	1.41	31	60.06	75	351.56
5	1.56	32	64	76	361.00
5¼	1.72	33	68.06	77	370.56
5½	1.89	34	72.25	78	380.25
5.656	2	35	76.56	79	390.06
5¾	2.06	36	81.00	80	400.00
6	2.25	37	85.56	81	410.06
6¼	2.44	38	90.25	82	420.25
6½	2.64	39	95.06	83	430.56
6¾	2.84	40	100.00	84	440.00
7	3.06	41	105.06	85	451.56
7¼	3.28	42	110.25	86	462.25
7½	3.51	43	115.56	87	473.06
7¾	3.75	44	121.00	88	484.00
8	4	45	126.56	89	495.06
8¼	4.25	45.25	128	90	506.25
8½	4.51	46	132.25	90.50	512
8¾	4.78	47	138.06	91	517.56
9	5.06	48	144.00	92	529.00
9¼	5.34	49	150.06	93	540.56
9½	5.64	50	156.25	94	552.25
9¾	5.94	51	162.56	95	564.06
10	6.25	52	169.00	96	576.00
11	7.56	53	175.56	97	588.06
11.31	8	54	182.25	98	600.25
12	9.00	55	189.06	99	612.56
13	10.56	56	196.00	100	625.00
14	12.25	57	203.06		

EQUATIONS RELATING TO FOCI.

The following simple optical formulas and calculations, worked out by Mr. J. A. C. Branfill, will prove useful in many branches of photography, especially where several lenses of varying foci are in constant use for a variety of purposes:

p = Principal focus.
F = Greater conjugate focus.
f = Lesser conjugate focus.
r = Ratio of any dimension in original to the same dimensions in copy (in case of reduction), or *vice versa* (in case of enlargement).
a = Diameter of aperture to lens.
x = Exposure required, assuming that $x = 1$ when $a = \frac{p}{4}$.

$$p = \frac{r(F+f)}{(r+1)^2}$$

$$f = p\left(\frac{1+r}{r}\right) = \frac{F+f}{r+1}$$

$$F = p(r+1) = rf$$

$$F+f = p \times \frac{(r+1)^2}{r} = p\left(2+r+\frac{1}{r}\right)$$

$$r = \frac{F-p}{p} = \frac{p}{f-p} = \frac{F}{f}$$

$$x = \frac{f^2}{16\,a^2}$$

N. B.—For ordinary landscape work, where r is greater than 20, x may be taken as $\frac{p^2}{16\,a^2}$

NOTE.—In case the above may not be clear to some photographers, the following rules may be better understood:

To find the principal focus of a lens (p), focus a near object in the camera, and measure the distance between it and the ground glass ($F+f$); next find the proportion which any dimension in the object bears to the same dimension on the ground glass (r). Thus, if the original dimension be four times as large as its reproduction, we say that r equals (=) 4. Multiply $F+f$ by r, and divide the product by the square of a number greater by one than r $(r+1)^2$. This rule was lately published by Mr. Debenham.

To find the lesser conjugate focus (f) (if p and r are known), multiply p by the sum of $r+1$ and divide the product by r. Or divide $F+f$ by $r+1$.

To find the greater conjugate focus (F) multiply p by $r+1$. Or multiply f by r.

To find $F+f$ (the distance which the ground glass should be from the object to be copied in order to get a given value for r) multiply p by the sum of $r + \frac{1}{r} + 2$.

To find r divide $F-p$ (the difference between F and p) by p. Or divide p by $f-p$. Or divide F by f.

To find x divide the square of f by 16 times the square of a (the diameter of aperture to lens).

For example Focus an object which is five inches high, so that it is one inch high on the ground glass; thus we know that $r = 5$. Next measure the distance between the object and the ground glass ($F+f$), which is found to be 45 inches.

Then $p = 45 \times$ (multiplied by) $5 \div$ (divided by) $6 \times 6 = 6\frac{1}{4}$ inches.
$f = 6\frac{1}{4} \times 6 \div 5 = 7\frac{1}{2}$ inches. Or $f = 45 \div 6 = 7\frac{1}{2}$ inches.
$F = 6\frac{1}{4} \times 6 = 37\frac{1}{2}$ inches. Or $F = 7\frac{1}{2} \times 5 = 37\frac{1}{2}$ inches.
$F+f = 6\frac{1}{4} \times (5 + \frac{1}{5} + 2) = 6\frac{1}{4} \times 7\frac{1}{5} = 45$ inches.
$r = (37\frac{1}{2} - 6\frac{1}{4}) \div 6\frac{1}{4} = 5$. Or $r = 6\frac{1}{4} \div (7\frac{1}{2} - 6\frac{1}{4}) = 5$.

And x (the exposure required) will be $7\frac{1}{2} \times 8\frac{1}{2} \div (16 \times \frac{9}{16}) = 6\frac{1}{4}$; that is, the exposure will be $6\frac{1}{4}$ times as much as the exposure required with an aperture whose diameter equals $p \div 4$, assuming the aperture (a) to be $\frac{3}{4}$ inch diameter.

Negative by A. Peebles Smith, New York.

THE REGATTA.

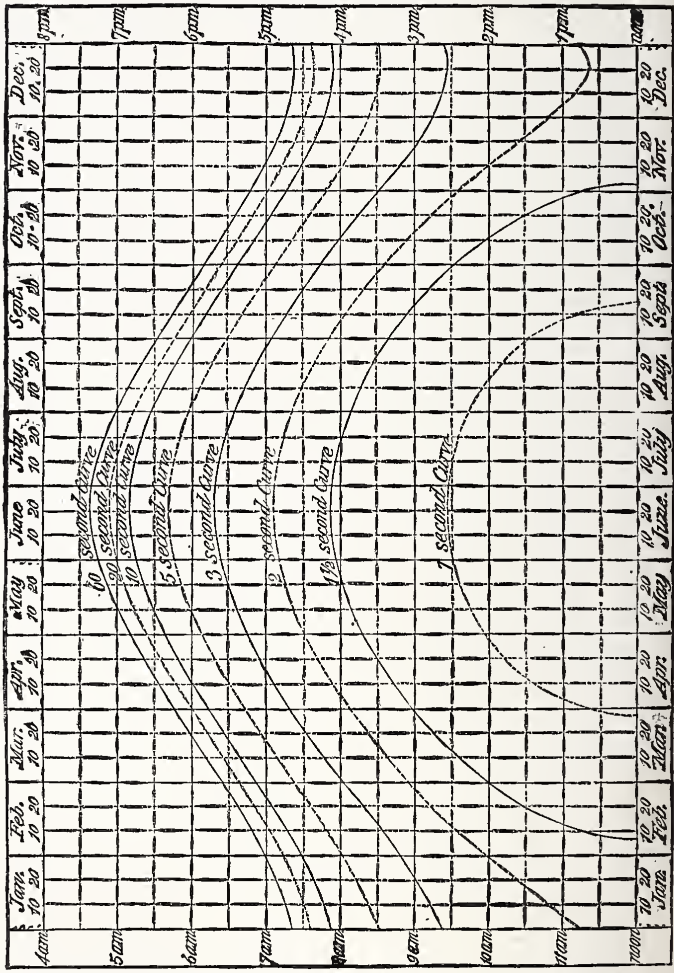
N. Y. Eng. & Printing Co.

PROF. BURTON'S TABLE OF COMPARATIVE EXPOSURES.

Apertures Calculated on the Standard System of the Photographic Society.	Sea and Sky.	Open Landscape.	Landscape with heavy foliage in foreground.	Under Trees, up to		Fairly Lighted Interiors.		Badly Lighted Interiors, up to		Portraits in bright diffused Light out of doors.	Portraits in good Studio Light.		Portraits in Ordinary Room.	
				mins.	secs.	mins.	secs.	hrs.	mins.		mins.	secs.	mins.	secs.
No. 1, or $\frac{f}{4}$	$\frac{1}{160}$ sec.	$\frac{1}{50}$ sec.	$\frac{1}{8}$ sec.	0	10	0	10	0	2	$\frac{1}{6}$ sec.	0	1	0	4
No. 2, or $\frac{f}{5.657}$	$\frac{1}{80}$ sec.	$\frac{1}{25}$ sec.	$\frac{1}{4}$ sec.	0	20	0	20	0	4	$\frac{1}{3}$ sec.	0	2	0	8
No. 4, or $\frac{f}{8}$	$\frac{1}{40}$ sec.	$\frac{1}{12}$ sec.	$\frac{1}{2}$ sec.	0	40	0	40	0	8	$\frac{2}{3}$ sec.	0	4	0	16
No. 8, or $\frac{f}{11.314}$	$\frac{1}{20}$ sec.	$\frac{1}{6}$ sec.	1 sec.	1	20	1	20	0	16	$1\frac{1}{3}$ sec.	0	8	0	32
No. 16, or $\frac{f}{16}$	$\frac{1}{10}$ sec.	$\frac{1}{3}$ sec.	2 secs.	2	40	2	40	0	32	$2\frac{2}{3}$ secs.	0	16	1	4
No. 32, or $\frac{f}{22.627}$	$\frac{1}{5}$ sec.	$\frac{2}{3}$ sec.	4 secs.	5	20	5	20	1	4	$5\frac{1}{3}$ secs.	0	32	2	8
No. 64, or $\frac{f}{32}$	$\frac{2}{5}$ sec.	$1\frac{1}{3}$ sec.	8 secs.	10	40	10	40	2	8	$10\frac{2}{3}$ secs.	1	4	4	16
No. 128, or $\frac{f}{45.255}$	$\frac{4}{5}$ sec.	$2\frac{2}{3}$ secs.	16 secs.	21	20	21	20	4	16	21 secs.	2	8	8	32
No. 256, or $\frac{f}{64}$	$1\frac{3}{5}$ sec.	$5\frac{1}{3}$ secs.	32 secs.	42	40	42	40	8	32	42 secs.	4	16	17	4

DIAGRAM OF COMPARATIVE EXPOSURES.

Computed for the latitude of Washington, D. C. (38 deg., 54 min., N.)
By Lieut. Commander S. W. Very, U. S. N.



The straight lines in this diagram represent divisions of time; the vertical ones showing the month and day, and the horizontal ones the time of day as shown by a sun-dial.

The curved lines are curves of equal altitudes of the sun, computed for the latitude of Washington, for the year 1889.

The combination of the two systems of lines is designed to enable the Photographer, whether amateur or professional, who has at some time determined the length of exposure required under certain circumstances of subject, clouds, lens, diaphragm, plate or film, etc., to decide what exposure to give *under the same circumstances*, at any time between sunrise and sunset, on any day of the year.

The diagram is based upon one constructed for the latitude of London, published in the *Photographic News*, in 1887, and reprinted in the Annual of 1888, and the same standard of comparison is used in this adaptation—that is, such circumstances of subject, clouds, lens, diaphragm, plate or film, etc., as will require an exposure of one second, at noon of any day between the 4th of April and the 7th of September, or at any time between a quarter to ten in the forenoon and a quarter past two in the afternoon of the 21st of June.

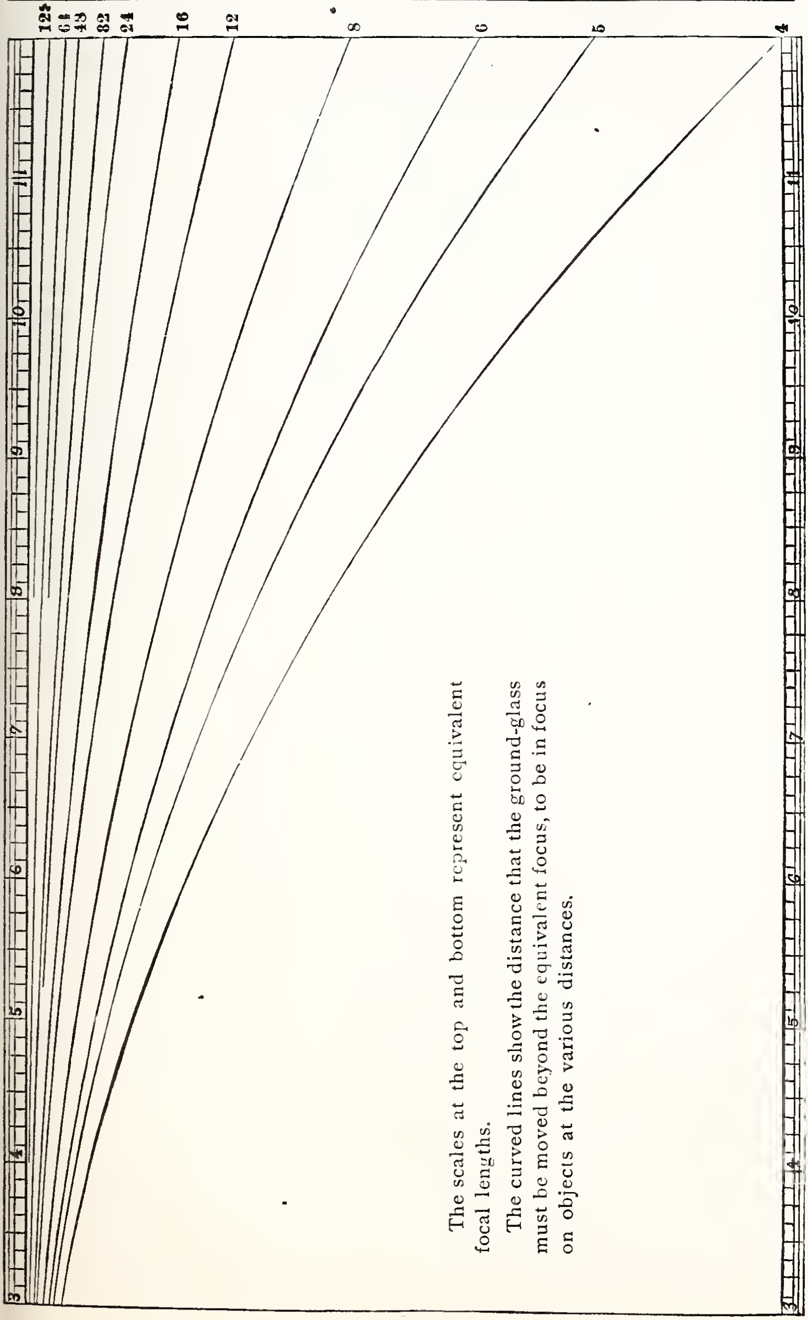
The diagram, although constructed for the year 1889, and for the latitude of Washington, will serve equally well for any other year, and well enough for ordinary purposes, throughout the United States, (exclusive of Alaska), although in the extreme Northern and Southern belts it will not be accurate.

The diagram is strictly accurate for "apparent time," only, but it is sufficiently so for "local mean time," (which may differ 16 minutes from "apparent time"), and in the great majority of places for "standard time," (which in some places differs half an hour from "mean time," and may differ three-quarters of an hour from "apparent time").

SAMUEL W. VERY, *Lieutenant Commander, U. S. Navy.*

FOCUSING SCALES FOR ANY LENS OF FROM 3 TO 12 INCHES EQUIVALENT FOCUS.

Drawn by W. T. WINTRINGHAM.



The scales at the top and bottom represent equivalent focal lengths.

The curved lines show the distance that the ground-glass must be moved beyond the equivalent focus, to be in focus on objects at the various distances.

TABLE SHOWING DISPLACEMENT ON GROUND GLASS OF OBJECTS IN MOTION.

By HENRY L. TOLMAN.

[Republished, with corrections, from the *Photographic Times.*]

Lens 6 in Equiv. Focus, Ground Glass at Principal Focus of Lens.

Miles per Hour.	Feet per Second.	Distance on Ground Glass, in inches, with Object 30 Feet away.	Same with Object 60 Feet away.	Same with Object 120 Feet away.
1	1½	.29	.15	.073
2	3	.59	.29	.147
3	4½	.88	.44	.220
4	6	1.17	.59	.293
5	7½	1.47	.73	.367
6	9	1.76	.88	.440
7	10½	2.05	1 03	.513
8	12	2 35	1.17	.587
9	13	2.64	1.32	.660
10	14½	2.93	1.47	.733
11	16	3.23	1.61	.807
12	17½	3.52	1.76	.880
13	19	3.81	1.91	.953
14	20½	4.11	2.05	1.027
15	22	4.40	2.20	1.100
20	29	5.87	2.93	1.467
25	37	7.33	3 67	1.833
30	44	8.80	4.40	2.200
35	51	10.27	5.13	2.567
40	59	11.73	5.97	2·933
45	66	13.20	6.60	3.300
50	73	14.67	7.33	3.667
55	80	16.13	8.06	4.033
60	88	17.60	8.80	4.400
75	110	22.00	11.00	5.500
100	147	29.33	14.67	7.333
125	183	36.67	18.33	9.167
150	220	44.00	22.00	11.000

LANTERNISTS' READY RFFERENCE TABLE.

(From Optical Magic Lantern Journal.)

If A=focal length of objective, B=diameter of slide, C=diameter of disc on screen, D=distance between objective and screen, then $D=\frac{C \times A}{B}$ $A=\frac{D \times B}{C}$ $C=\frac{D \times B}{A}$

The following table has been computed by these rules and will show by a glance the relations between the size of disc and distance from screen for object glasses of all foci from 4 inches to 15 inches. The diameter of slide is taken as 3 inches, that being the usual opening of the mat.

Distance between Lantern and Screen.	FOCUS OF LENS.											
	4in.	5in.	6in.	7in.	8in.	9in.	10in.	11in.	12in.	13in.	14in.	15in.
	DIAMETER OF DISC.											
	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.
10 feet.	7 6	6 0	5 0	4 3	3 9	3 4	3 0	2 9	2 6	2 4	2 2	2 0
11 "	8 3	6 7	5 6	4 9	4 2	3 8	3 4	3 0	2 9	2 6	2 4	2 2
12 "	9 0	7 2	6 0	5 2	4 6	4 0	3 7	3 3	3 0	2 9	2 7	2 5
13 "	9 9	7 10	6 6	5 7	4 11	4 4	3 11	3 7	3 3	3 0	2 9	2 7
14 "	10 6	8 5	7 0	6 0	5 3	4 8	4 2	3 10	3 7	3 3	3 0	2 9
15 "	11 3	9 0	7 6	6 5	5 8	5 0	4 6	4 1	3 9	3 6	3 3	3 0
20 "	15 0	12 0	10 0	8 7	7 6	6 8	6 0	5 6	5 0	4 7	4 3	4 0
25 "	18 9	15 0	12 6	10 9	9 4	8 4	7 6	6 10	6 3	5 0	5 4	5 0
30 "	22 6	18 0	15 0	12 10	11 3	10 0	9 0	8 2	7 6	6 11	6 5	6 0
35 "	26 3	21 0	17 6	15 0	13 1	11 8	10 6	9 6	8 9	8 1	7 6	7 0
40 "	30 0	24 0	20 0	17 2	15 0	13 4	12 0	10 10	10 0	9 2	8 6	8 0
45 "	33 9	27 0	22 6	19 3	16 10	15 0	13 6	12 3	11 3	10 4	9 8	9 0
50 "	37 6	30 0	25 0	21 5	18 9	16 8	15 0	13 8	12 6	11 6	10 9	10 0

EXAMPLES.—An 8in. focus lens at a distance of 35ft. will give a disc of 13ft. 1in. To produce a disc of 12ft. with a lens of 10in. focus, the lantern and screen must be separated by 40ft. To produce a disc of 15ft. at a distance of 45ft. will require a lens of 9in. focus.

TABLE FOR ENLARGEMENT AND REDUCTION

COMPUTED FOR CENTIMETERS OR INCHES.

Equivalent Focus of the Lens.	Distances of the Object and the Ground Glass Screen from the Center of the Objective.																								
	1 *t.*	2 *t.*	3 *t.*	4 *t.*	5 *t.*	6 *t.*	7 *t.*	8 *t.*	9 *t.*	10 *t.*	11 *t.*	12 *t.*	13 *t.*	14 *t.*	15 *t.*	16 *t.*	17 *t.*	18 *t.*	19 *t.*	20 *t.*	21 *t.*	22 *t.*	23 *t.*	24 *t.*	25 *t.*
5..	10 10	15 7.5	20 6.7	25 6.2	30 6	35 5.8	40 5.7	45 5.6	50 5.6	55 5.5	60 5.4	65 5.4	70 5.4	75 5.4	80 5.3	85 5.3	90 5.3	95 5.3	100 5.3	105 5.3	110 5.2	115 5.2	120 5.2	125 5.2	130 5.2
6..	12 12	18 9	24 8	30 7.5	36 7.2	42 7	48 6.9	54 6.8	60 6.7	66 6.6	72 6.5	78 6.5	84 6.4	90 6.4	92 6.4	102 6.4	108 6.4	114 6.3	120 6.3	126 6.3	132 6.3	138 6.3	144 6.3	150 6.3	156 6.2
7..	14 14	21 10.5	28 9.3	35 8.8	42 8.4	49 8.2	56 8	63 7.9	70 7.8	77 7.7	84 7.6	91 7.6	98 7.5	105 7.5	112 7.5	119 7.4	126 7.4	133 7.4	140 7.4	147 7.4	154 7.3	161 7.3	168 7.3	175 7.3	182 7.3
8..	16 16	24 12	32 10.7	40 10	48 9.6	56 9.3	64 9.1	72 9	80 8.8	88 8.8	96 8.7	104 8.7	112 8.6	120 8.6	128 8.5	136 8.5	144 8.5	152 8.4	160 8.4	168 8.4	176 8.4	184 8.4	192 8.3	200 8.3	208 8.3
9..	18 18	27 13.5	36 12	45 11.3	54 10.8	63 10.5	72 10.3	81 10.1	90 9.9	99 9.9	108 9.8	117 9.8	126 9.7	135 9.6	144 9.6	153 9.6	162 9 5	171 9.5	180 9.5	189 9.5	198 9.4	207 9.4	216 9.4	225 9.4	234 9.4
10..	20 20	30 15	40 13.3	50 12.5	60 12	70 11.7	80 11.4	90 11.3	100 11.1	110 11	120 10.9	130 10.8	140 10.8	150 10.7	160 10.7	170 10.6	180 10.6	190 10.6	200 10.5	210 10.5	220 10.5	230 10.5	240 10.4	250 10.4	260 10.4
11..	22 22	33 16.5	44 14.7	55 13.8	66 13.2	77 12.8	88 12.6	99 12.4	110 12.2	121 12.1	132 12	143 11.9	154 11.8	165 11.8	176 11.7	187 11.7	198 11.6	209 11.6	220 11.6	231 11.6	242 11.5	253 11.5	264 11.5	275 11.5	286 11.4
12..	24 24	36 18	48 16	60 15	72 14.4	84 14	96 13.7	108 13.5	120 13.3	132 13.2	144 13.1	156 13	168 12.9	180 12.9	192 12.8	204 12.7	216 12.7	228 12.7	240 12.6	252 12.6	264 12.6	276 12.5	288 12.5	300 12.5	312 12.5
13..	26 26	39 19.5	52 17.3	65 16.3	78 15.6	91 15.1	104 14.9	117 14.6	130 14.4	143 14.3	156 14.2	169 14.1	182 14	195 13.9	208 13.9	221 13.8	234 13.8	247 13.7	260 13.7	273 13.7	286 13.6	299 13.6	312 13.6	325 13.5	338 13.5
14..	28 28	42 21	56 18.7	70 17.5	84 16.8	98 16.3	112 16	126 15.8	140 15.6	154 15.4	168 15.3	182 15.2	196 15.1	210 15	224 14.9	238 14.9	252 14.8	266 14.8	280 14.7	294 14.7	308 14.7	322 14.6	336 14.6	350 14.6	364 14.6
15..	30 30	45 22.5	60 20	75 18.8	90 18	105 17.5	120 17.1	135 16.9	150 16.7	165 16.5	180 16.4	195 16.3	210 16.2	225 16.1	240 16	255 15.9	270 15.9	285 15.8	300 15.8	315 15.8	330 15.7	345 15.7	360 15.7	375 15.6	390 15.6

16..	32	48	64	80	96	112	128	144	160	176	192	208	224	240	256	272	288	304	320	336	352	368	384	400	416
	32	24	21.3	20	19.2	18.7	18.3	18	17.8	17.6	17.5	17.3	17.2	17.1	17.1	16.9	16.9	16.9	16.8	16.8	16.8	16.7	16.7	16.7	16.6
17..	34	51	68	85	102	119	136	153	170	187	204	221	238	255	272	289	306	323	340	357	374	391	408	425	442
	34	25.5	22.7	21.3	20.4	19.8	19.4	19.1	18.9	18.7	18.5	18.4	18.3	18.2	18.1	18.1	18	17.9	17.9	17.9	17.8	17.8	17.7	17.7	17.7
18..	36	54	72	90	108	126	144	162	180	198	216	234	252	270	288	306	324	342	360	378	396	414	432	450	468
	36	27	24	22.5	21.6	21	20.6	20.3	20	19.8	19.6	19.5	19.4	19.3	19.2	19.1	19.1	19	18.9	18.9	18.8	18.8	18.8	18.8	18.7
19..	38	57	76	95	114	133	152	171	190	209	228	247	266	285	304	323	342	361	380	399	418	437	456	475	494
	38	28.5	25.3	23.8	22.8	22.2	21.7	21.4	21.1	20.9	20.7	20.6	20.5	20.4	20.3	20.2	20.1	20.1	20	20	19.9	19.8	19.8	19.8	19.8
20..	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400	420	440	460	480	500	520
	40	30	26.6	25	24	23.3	22.9	22.5	22.2	22	21.8	21.7	21.5	21.4	21.3	21.3	21.2	21.2	21.1	21	21	20.9	20.9	20.8	20.8
21..	42	63	84	105	126	147	168	189	210	231	252	273	294	315	336	357	378	399	420	441	462	483	504	525	546
	42	31.5	28	26.3	25.2	24.5	24	23.7	23.3	23.1	22.9	22.8	22.6	22.5	22.4	22.3	22.2	22.2	22.1	22.1	22	21.9	21.9	21.9	21.8
22..	44	66	88	110	132	154	176	198	220	242	264	286	308	330	352	374	396	418	440	462	484	506	528	550	572
	44	33	29.3	27.5	26.4	25.7	25.1	24.8	24.4	24.2	24	23.8	23.7	23.6	23.5	23.4	23.2	23.2	23.2	23.1	23	23	23	22.9	22.1
23..	46	69	92	115	138	161	184	207	230	253	276	299	322	345	368	391	414	437	460	483	506	529	552	575	598
	46	34.5	30.7	28.8	27.6	26.7	26.3	25.9	25.6	25.3	25.1	24.9	24.8	24.6	24.5	24.4	24.3	24.3	24.2	24.2	24.1	24	24	24	23.9
24..	48	72	96	120	144	168	192	216	240	264	288	312	336	360	384	408	432	456	480	504	528	552	576	600	624
	48	36	32	30	28.8	28	27.4	27	26.7	26.4	26.2	26	25.8	25.7	25.6	25.5	25.4	25.3	25.3	25.2	25.1	25.1	25	25	25
25..	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650
	50	37.5	33.3	31.3	30	29.2	28.6	28.1	27.8	27.5	27.3	27.1	26.9	26.8	26.7	26.6	26.5	26.4	26.3	26.3	26.2	26.1	26.1	26	26

The use of the above table will best be explained by illustrations:

To enlarge six times with a lens of 15 centimeters (or inches) focal length. We find in the table under 6 *t.* and opposite the figures $\frac{105}{17.5}$, hence the object must be 17.5, and the screen 105 centimeters (or inches) from the centre of the lens.

To reduce eight times with a lens of 19 centimeters (or inches) focus, the object must be 171 and the screen 21.4 centimeters (or inches) from centre of lens.

The table can be formulated thus: Where p = focal length of lens, a = distance from ground-glass to centre of lens and b = distance from object to centre of lens, then $\frac{1}{a} + \frac{1}{b} = \frac{1}{p}$

TABLE OF THE SYMBOLS, ATOMICITY, ATOMIC AND EQUIVALENT WEIGHTS OF THE ELEMENTS.

	Symbol and Atomic Value.	Atomic Weight.	Equivalent Weight.
Aluminium (Al_2^{vi})	Al^{iv}	27·5	9·13
Antimony (Sb''')	Sb^{v}	122	40·66
Arsenicum (As''')	As^{v}	75	25·0
Barium	Ba''	137	68·5
Beryllium, or Glucinum	Be''	9·5	4·7
Bismuth (Bi''')	Bi^{v}	208	69·33
Boron	B'''	11	3·66
Bromine	Br'	80	80·0
Cadmium	Cd''	112	56·0
Cæsium	Cs'	133	135·0
Calcium	Ca''	40	20·0
Carbon (C'')	C^{iv}	12	3·0
Cerium (Ce'')	Ce^{vi}	92	46·0
Chlorine	Cl'	35·5	35 5
Chromium Cr_2^{vi})	Cr^{vi}	52·5	26·1
Cobalt (Co'')	Co^{vi}	58·8	29·4
Copper	Cu''	63·5	{ 63·4 31·7
Davyum	—	—	—
Decipium	—	—	—
Didymium	D''	96	47·5
Erbium (?)	Eb''	112·6	56·3
Fluorine	F'	19	19·0
Gallium	—	—	—
Gold	Au'''	196·7	65·33
Hydrogen	H'	1	1·
Indium	In^{vi}	75·6	37·8
Iodine	I'	127	127·0
Iridium	Ir^{iv}	107	49·5
Iron (Fe'' & Fe_2^{vi})	Fe^{vi}	56	{ 28·0 18·66
Lanthanium	La'	92	46·4
Lavœsium	—	—	—
Lead (Pb'')	Pb^{iv}	207	103·5
Lithium	L'	7	7·0
Magnesium	Mg''	24	12·0
Manganese (Mn'' & Mn^{iv})	Mn^{vi}	55	27·5
Mercury	Hg''	200	{ 200·0 100·0
Molybdenum	Mo^{vi}	96	45·4
Mosandeum	—	—	—
Nephmium	—	—	—
Nickel (Ni'')	Ni^{vi}	58·8	29·4
Niobium	Nb^{v}	97·6	18·8
Nitrogen (N' & N''')	N^{v}	14	4·66
Norwegium	—	—	—
Osmium	Os^{iv}	199	49·75

TABLE OF SYMBOLS, ETC.—(*Continued.*)

	Symbol and Atomic Value.	Atomic Weight.	Equivalent Weights.
Oxygen..........................	O''	16	8·0
Palladium........................	Pd^{iv}	106·5	53·25
Phillipium.................... ..	—	—	—
Phosphorus (P''')................	P^{v}	31	10·33
Platinum.........................	Pt^{iv}	198	98·7 49 35
Potassium (Kalium)..............	K'	39	39 1
Rhodium.........................	Rh^{iv}	104·3	52·2
Rubidium...........	Rb'	85·3	85·4
Ruthenium.......................	Ru^{iv}	104·2	26·0
Scandium....	—	—	—
Selenium	Se^{vi}	79·5	39·7
Silicon (Silicium)...............	Si^{iv}	28	7·0
Silver............................	Ag'	108	108·0
Sodium (Natrium)................	Na'	23	23·0
Strontium....	Sr''	87·5	43·75
Sulphur S'' & S^{iv}).......	S^{vi}	32	16·
Tantalum.........................	Ta^{v}	182	36·4
Tellurium......................	Te^{vi}	129	64·0
Terbium (?)......................	—	—	—
Thallium.......	Tl''	204	204·0
Thorinum (Thorium)............	Th''	232	57·87
Tin (Sn'')........................	Sn^{iv}	118	59·0 29·5
Titanium...................... ...	Ti^{iv}	50	12·5
Tungsten.........................	W^{vi}	184	46·0
Uralium	—	—	—
Uranium.........................	U^{vi}	120	60·
Vanadium....	V^{v}	51·3	17·1
Yttirbium........................	—	—	—
Yttrium..........................	Y''	61·7	30·85
Zinc..............................	Zn''	65	32·6
Zirconium........................	Zr^{iv}	89·5	22·4

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Name.	Symbol.	Mol. Weight.	One Part is Soluble in Cold Water	One Part is Soluble in Hot Water.	Alcohol.
Acid, Acetic, Glacial	$HC_2H_3O_2$	60	s.	s.	s.
" Boracic or Boric	H_3BO_3	62	30	3	1 in 30
" Carbolic (see Phenol)	HC_6H_6O	94	16·6	s.	s.
" Chlorhydric (see Hydrochloric)					
" Citric	$H_3C_6H_5O_7,H_2O$	210	·75	·5	10 in 15
" Digallic (see Tannic Acid)					
" Formic	H,CHO_2	46			
" Gallic	$HC_7H_5O_5$	170	100	3	1 in 8
" Hydrobromic	HBr	81			
" Hydriodic	HI	128			
" Hydrochloric	HCl	36·5			
" Hydrocyanic	HCy	27			
" Hydrosulphuric	H_2S	34			
" Muriatic (see Hydrochloric)					
" Nitric	HNO_3	63			
" Nitrous	HNO_2	47			
" Oxalic	$H_2C_2O_4, 2H_2O$	126	8	1	n. s.
" Pyrogallic (see Pyrogallol)	$H_3C_6H_3O_3$	126	3·5	1	v.s.& ether
" Salicylic	$HC_7H_5O_3$	138	760	9	v.s.& ether
" Sulphuric	H_2SO_4	98			
" Sulphurous	H_2SO_3	82		al	so in ether
" Tannic (see Digallic Acid)	$H_4C_{27}H_{18}O_{17}$	618	·8	·5	10 in 8
" Tartaric	$H_4C_4H_2O_6$	150	·8	·5	1 in 5
Alcohol, Ethyl	C_2H_5OH	46			
" Methyl (see Wood Alcohol)	CH_3HO	32			
Alum (see Potassium Aluminium Sulphate)					

Alum Chrome (see Potassium Chromic Sulph.)					
Ammonia, Gaseous	H_3N	17	v. s.		
Ammonium, Bichromate	$(NH_4)_2Cr._2O_7$	253	v. s.	v. s.	
" Bromide	NH_4Br	98	1·5	1	1 in 13
" Carbonate (see Sal volatile)	$NH_4HCO_3 + NH_4CO_2NH_2$	175	4	dec.	sp. s.
" Chloride (see Sal ammoniac)	NH_4Cl	53·5	3	1	sp. s.
Ammonium Fluoride	NH_4F	37	v. s.	v. s.	sp. s.
" Iodide	NH_4I	145	1	·5	s.
" Nitrate	NH_4NO_3	80	2	1	s.
" Oxalate	$(NH_4)_2C_2O_4$	124	v. s.	v. s.	1:2
" Sulphide	NH_4HS	51	v. s.	v. s.	1:2
" Sulpho-cyanide	NH_4CNS	76	1	·5	s.
Barium, Bromide	$BaBr_2$	297	·90	·75	s.
" Chloride	$BaCl_2, 2H_2O$	244	2·18	1·5	sp. s.
" Iodide	BaI_2	391	·48	·35	v. s.
" Per-oxide	BaO_2	169	n. s.	n. s.	in hdchl. acid
Bicarbonate of Potassa (see Potassium Bicarb).					
Bicarbonate of Soda (see Sodium Bicarbonate)					
Bichloride of Mercury (see Mercuric Chloride)					
Bromine	Br	79·8	s.	s.	s.
BORAX (see Sodium Biborate)					
Cadmium, Bromide	$CdBr_2, 4H_2O$	344	1·5	1	sp. s.
" Chloride	$CdCl_2$	183	·71	·67	sp. s.
" Iodide	CdI_2	366	1·5	1	1 in 2
Calcium, Bromide	$CaBr_2, 4H_2O$	272	1	·75	s.
" Carbonate (see Chalk)	$CaCO_3$	100	n. s.	n. s.	n. s.
" Chloride	$CaCl_2$	111	·75	·5	1 in 10
" Hypochlorite (see Chloride of Lime)	$CaCl_2O_2CaCl_2$	254	sp. s.	sp.	dec.
" Iodide	CaI_2	294	·75	·5	1 in 10
Calomel (see Mercurous Chloride)					
Carbonate of Ammonia (see Ammonium Carb)					
Carbonate of Potash (see Potassium Carbonate)					
" of Soda (see Sodium Carbonate)					
Caustic Potash (see Potassium Hydrate)					
" Soda (see Sodium Hydrate)					

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Name.	Symbol.	Mol. Weight.	One Part is Soluble in Cold Water	One Part is Soluble in Hot Water.	Alcohol.
Chalk (see Calcium Carbonate)					
Chloride of Lime (see Calcium Hypochlorite)					
Chlorine	Cl	35·4	1:2·5	Volumes.	
Chrome. Alum (see Potassium Chromic Sulph.)					
Copper Acetate (see Verdigris)	$Cu(C_3H_3O_2)_2,H_2O$	200	14	5	1 in 14
" Bromide	$CuBr_2$	223·4	1	·75	s.
" Chloride	$CuCl_2,H_2O$	170·5	1	·75	v. s.
" Sulphate (see Blue Vitriol)	$CuSO_4.5H_2O$	249·2	3	1	n. s.
" " and Ammonia	$CuSO_4,4NH_3$	245·5	s.	v. s.	n. s.
Corrosive Sublimate (see Mercuric Chloride)					
Epsom Salts (see Magnesium Sulphate)					
Glaubers Salt (see Sodium Sulphate)					
Glycerine	$C_3H_5(HO)_3$	92	s.	s.	s.
Gold, Perchloride	$AuCl_3$	302·5	1	·75	also in ether
Green Vitriol (See Iron Sulphate)					
Hydrokinone	C_6H_42HO	110	3	s.	also in ether
Hydroxylamine Chloride	NH_3OHCl		v. s.	v. s.	n. s.
Iodine	I	126.6	sp. s.	sp. s.	v. s.
Iron, Ammonium Sulphate	$FeSO_4(NH_4)_2SO_4+6H_2O$	392	v. s.	dec.	n. s.
" Chloride (Ferric)	Fe_2Cl_6	325	·75	·5	1 in 1
" " (Ferrous)	$FeCl_2$	127	2	1	1 in 1
" Citrate	$Fe_2(C_6H_5O_7)_2$	598	s.	s.	n. s.
" Iodide	FeI_2	310	v. s.	v. s.	v. s.
" Nitrate	$Fe(NO_3)_2.6H_2O$	288	v. s.	dec.	dec.
" Oxalate (Ferric)	$Fe_2(C_2O_4)_3$	376	s.	s.	n. s.
" Oxalate (Ferrous)	FeC_2O_4	144	in potass-	ium oxal.	n. s.

Iron, Sulphate (Ferric)	$Fe_2(SO_4)_3$	400	s.	dec.	s.
" Sulphate (Ferrous)	$FeSO_4, 7H_2O$	278	1·5	1	n. s.
Lead, Acetate (see Sugar of Lead)	$Pb.(C_2H_3O_2)_2.3H_2O$	379	2·5	2	1 in 12·5
" Carbonate	$(PbCO_3)Pb(HO)_2$	774	n. s.	sp. s.	n. s.
" Iodide	PbI_2	460	s.	s.	n. s.
" Nitrate	$Pb(NO_3)_2$	331	7·7	7	s.
" Oxide	PbO	223	n. s.	n. s.	Alkalis.
Lithium, Bromide	$LiBr$	87	·66	·5	v. s.
" Chloride	$LiCl$	42·5	1·3	1	s.
" Iodide	LiI	134	·61	·5	s.
Magnesium, Bromide	$MgBr_2$	184	1	·75	s.
" Chloride	$MgCl_2$	95	2	1·5	s.
" Iodide	MgI_2	278	1	·75	v. s.
" Sulphate (see Epsom Salt)	$MgSO_4, 7H_2O$	246	1·3	1	sp. s.
Mercury, Chloride (Mercuric) (see Corros. Subl)	$HgCl_2$	271	19	3	5
" " (Mercurous) (see Calomel)	Hg_2Cl	235·5	n. s.	n. s.	n. s.
" Cyanide	$HgCy_2$	252	8	2	1 in 20
" Iodide (Mercuric)	HgI_2	454	sp. s.	sp. s.	sp. s.
" " (Mercurous)	Hg_2I	327	n. s.	n. s.	n. s.
Phenol (see Carbolic Acid)	......	......	......	......	......
Platinum Chloride	$PtCl_4$	339	1	·5	s.
Potassa (see Potassium Hydrate)	......	......	......	......	......
Potassium, Aluminium Sulphate (see Alum)	$Al_2(SO_4)_3, K_2SO_4, 24H_2O$	948	10	8	n. s.
" Bicarbonate	$KHCO_3$	100	3	2	n. s.
" Bichromate	$K_2Cr_2O_7$	294·6	10	7	n. s.
" Bromide	KBr	119·1	2	1	1 in 90
" Carbonate	KO_2C_3	138·2	·75	·5	n. s.
" Chlorate	$KClO_3$	122·4	16	2	n. s.
" Chloride	KCl	74·5	3	2	sp. s.
" Chromic Sulph. (see Chrome Alum)	$Cr_2(SO_4)_3, K_2SO_4, 24H_2O$	999	10	dec.	n. s.
" Citrate	$K_3C_6H_5O_7H_2O$	324·3	·6	·3	n. s.
" Cyanide	KCy	65	1	·5	sp. s.
" Ferric Sulphate	$K_2SO_4.Fe_2(SO_4)_3, 24H_2O$	100·6	s.	s.	n. s.
" Ferri-cyanide (see Red Prussiate)	$K_6Fe_2C_{12}N_{12}$	658	2·5	1·2	n. s.
" Ferro-cyanide (see Yel. Pruss.)	$K_4FeC_6 3H_2O$	422	3	1	n. s.

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Name.	Symbol.	Mol. Weight.	One Part is Soluble in Cold Water	One Part is Soluble in Hot Water.	Alcohol.
Potassium, Fluoride	KFl	94	v. s.	v. s.	v. s.
" Hydrate	KOH	56·1	·5	·25	sp. s.
" Iodide	KI	166·1	·75	·5	1 in 16
" Nitrate (see Saltpetre)	KNO_3	101·1	4	1	n. s.
" Oxalate	$KC_2O_4H_2O$	235	3	2	sp. s.
" Permanganate	$K_2Mn_2O_8$	314	16	10	n. s.
" Platino chloride	K_2PtCl_6	488·4	10	1	s.
" Sulpho-cyanide	KCyS	97	2	1	sp. s.
Prussiate of Potash, red (see Potassium Ferri-cyanide)					
Prussiate of Potash, yellow (see Potassium Ferro-cyanide)					
Pyrogallol (see Pyrogallic Acid)					
Sal ammoniac (see Ammonium Chloride)					
Sal soda (see Sodium Carbonate)					
Sal tartar (see Potassium Carbonate)					
Saleratus (see Potassium Bicarbonate)					
Sal volatile (see Ammonium Carbonate)					
Salt, common (see Sodium Chloride)					
Saltpetre (see Potassium Nitrate)					
Saltpetre of Chili (see Sodium Nitrate)					
Sesqui-Carbonate of Soda (see Sodium Carb)					
Silver, Acetate	$AgC_2H_3O_2$	167	sp.s.	sp. s.	n. s.
" Bromide	AgBr	188	n. s.	n. s.	in HCl and HBr.

Silver, Carbonate	Ag_2CO_3	276	n. s.	n. s.	n. s.
" Chloride	$AgCl$	143·5	n. s.	n. s.	Ammonia, cyan. potass. hypo sulphite of soda.
" Citrate	$Ag_3C_6H_5O_7$	513	sp. s.	sp. s.	....
" Fluoride	$AgFl$	127	v. s.	v. s.	v. s.
" Iodide	AgI	235	n. s.	n. s.	same as Chloride.
" Nitrate	$AgNO_3$	170	1	·5	sp. s.
" Nitrite	$AgNO_2$	154	300	dec.	n. s.
" Oxalate	$Ag_2C_2O_4$	304	sp. s.	s.	n. s.
" Oxide	Ag_2O	232	n. s.	n. s.	n. s.
" Sulphide	Ag_2S	248	n. s.	n. s.	n. s.
Soda, Caustic (see Sodium Hydrate)	....	....	....	....	....
Sodium Acetate	$NaC_2H_3O_2, 6H_2O$	190	3	·66	n. s.
" Biborate (Borax)	$Na_2B_4O_7, 10H_2O$	382	12·5	2	n. s.
" Bromide	$NaBr$	103	1·25	1	1:16
" Bicarbonate	$NaHCO_3$	84	12	dec.	n. s.
" Carbonate	$Na_2CO_3, 10H_2O$	286	2	1	n. s.
" Chloride	$NaCl$	58·5	2·75	2·75	n. s.
" Citrate	$Na_3C_6H_5O_7$	258	1	·5	sp. s.
" Hydrate	$NaHO$	40	1·5	·5	sp. s.
" Hypo-sulphite	$Na_2S_2O_3 5H_2O$	248	1·5	1	sp. s.
" Iodide	NaI	150	·5	·3	sp. s.
" Nitrate (see Chili Saltpetre)	$NaNO_3$	85	1·36	1	1 in ˆ7
" Sulph-antimonite	$NaSbS_3$	241	s.	s.	n. s.
" Sulphate	$Na_2SO_4, 10H_2O$	322	2	4	s.
" Sulphide	$Na_2S.9H_2O$	240	s.	s.	sp. s.
" Sulphite	$Na_2SO_3, 7H_2O$	252	4	2	sp. s.
" Thio-sulphate (see Hypo-sulphite)	....	....	....	....	....
Strontium, Bromide	$SrBr_2, 6H_2O$	355·5	1	·75	sp. s.
" Chloride	$SrCl_2, 6H_2O$	266·5	1·8	1	sp. s.
" Nitrate	$Sr(NO_3)_2$	211·5	5	2	sp. s.

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Name.	Symbol.	Mol Weight.	One Part is Soluble in Cold Water	One Part is Soluble in Hot Water.	Alcohol.
Sugar of Lead (see Lead Acetate)					
Sulphate Soda (see Sodium Sulphate)					
Tannin (see Digallic Acid)					
Thymol	$C_6H_3(CH_3(C_3H_7)COO$	177	sp.		& in ether
Tin, Chloride (Stannic)	$SnCl_4$	260	dec.	in much	water.
" Chloride (Stannous)	$SnCl_2.2H_2O$	225	v. s.	v. s.	v. s.
Uranium, Bromide	$UBr_2.4H_2O$	352	1	·5	sp. s.
" Nitrate	$UO_2(NO_3)_2, 6H_2O$	384	·5	·25	v. s.
" Sulphate	$UO_2(SO_4),3H_2O$	302	·5	·25	v. s.
Verdigris (see Copper Acetate)					
Vitriol, Blue (see Copper Sulphate)					
" Green (see Iron Sulphate)					
" White (see Zinc Sulphate)					
Washing Soda (see Sodium Carbonate)					
Wood Alcohol (see Alcohol Methyl)					
Zinc, Bromide	$ZnBr_2$	225·2	1	·5	s.
" Chloride	$ZnCl_2$	136·2	·33		s.
" Iodide	ZnI_2	319·2	·33	dec.	v. s.
" Nitrate	$Zn(NO_3)_2,6H_2O$	189	del.	del.	del.
" Sulphate (see White Vitriol)	$ZnSo_4,7H_2O$	287	·7	·5	n. s.

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Ramsey Eng. Co., N. Y

IN CHAUTAUQUA WOODS

IMPURITIES IN PHOTOGRAPHIC CHEMICALS AND TESTS FOR THEM.

SUBSTANCE.	IMPURITIES POSSIBLY PRESENT.	TESTS.
Ammonia	Carbonic Acid.	Renders lime-water milky.
	Dissolved solid matter	Residue left on evaporation.
	Chlorides.	After acidulating with nitric acid, it gives a precipitate with silver nitrate, which, after washing, is readily soluble in ammonia, and re-precipitated by nitric acid.
	Sulphates.	After acidulating with nitric acid, it gives a precipitate with barium nitrate.
	Lime.	A white precipitate with oxalate of ammonium.
	Lead is often present, derived from the action upon flint glass bottles.	Black precipitate with sulphuretted hydrogen.
Nitric Acid	Traces of sulphuric acid.	After dilution it gives a precipitate with barium nitrate.
	Chlorides.	After dilution it gives a precipitate with silver nitrate.
	Peroxide of nitrogen.	The acid is yellow.
	Iodine may be present if the acid be prepared from sodium nitrate.	After dilution and cooling it gives a blue color with starch paste or mucilage.
Hydrochloric Acid	Free chlorine.	Liberates iodine from solution of potassium iodide. See also chlorides, nitric acid.
	Sulphuric acid.	As above for nitric acid.
	Perchloride of iron.	Yellow color. Brown precipitate with ammonia added till it smells slightly.
Hydrochloric Acid	Arsenic.	Marsh's test.
	Some yellow samples contain no iron, but an organic salt, and give an alkaline ash on ignition of the residue after evaporation.	Reinsh's test; a small piece of copper foil becomes coated on boiling in dilute acid.
Sulphuric Acid	Bisulphate of potassium.	Residue on evaporation.
	Sulphate of lead.	Milkiness on dilution. May be completely freed from lead by diluting with three or four times as much water, and allowing to settle.
	When sold as pure, it invariably contains a trace of iron. Common acid is also liable to contain arsenic, selenium, thallium, and many other substances.	No easy test can be given, as the substances are so numerous; some of them volatile, and most require separation from the acid before detection.
	Organic matter, as a piece of straw in a carboy of acid.	Gives a brown color to the acid.
Acetic Acid	Water.	Does not solidify when cooled to 17° C, (53° F.)
	Sulphurous and hydrochloric acids.	White precipitate with silver nitrate.
	Aldehyde, or volatile tarry matter.	Blackens in the light after adding silver nitrate.
	Organic sulphuric acid.	Smell of garlic.
Citric Acid	Tartaric acid.	Strong solution of potassium acetate added to a strong solution of the acid will deposit white crystalline bitartrate.
Pyrogallic Acid	Metagallic acid.	Black residue insoluble in water.
Silver Nitrate	Free nitric acid.	Reddens litmus paper (neutral silver nitrate does not affect litmus).
Potassium Carbonate	Chlorides and sulphates.	Same as for ammonia.
Potassium Iodide	Potassium carbonate.	A strong solution is alkaline to test paper.
	Sulphates and chlorides.	Same as for ammonia.
	Potassium iodate.	A pretty strong solution becomes yellow from liberation of iodine on addition of dilute sulphuric acid, or better, a strong solution of citric acid.

IMPURITIES IN PHOTOGRAPHIC CHEMICALS AND TESTS FOR THEM.—*Continued.*

SUBSTANCE.	IMPURITIES POSSIBLY PRESENT.	TEST.
Potassium Bromide	Similar to potassium iodide.	See potassium iodide.
Sodium Carbonate	Chlorides and sulphates.	Same as for ammonia.
Sodium Chloride	Chloride of calcium. Chloride of magnesium.	Oxalate of ammonium (after addition of a little acetic acid) gives a milkiness or precipitate, indicating calcium; filter this out, and add ammonia, chloride of ammonium, and phosphate of sodium (clear solutions). A precipitate indicates magnesium. Both the above cause dampness in wet weather.
	Sodium sulphate.	As for sulphates in ammonia.
Potassium Cyanide Potassium Hydrate	Potassium carbonate nearly always present.	Effervescence with dilute acids, giving off a gas carbonic anhydride, which renders lime water turbid.
Kaolin	Chalk.	Effervescence with dilute acids.
Water	Sulphates and chlorides.	Same as for ammonia.
	Calcium carbonate, temporary hardness.	Deposited by boiling.
	Ammonia, almost always present in distilled and rain water.	Test as for calcium chloride, see sodium chloride. Brown coloration, or precipitate with Nessler's re-agent.
Gelatine	Alum.	Ash, sometimes as much as 10 per cent.
	Fatty matter.	Separated by precipitation with alcohol. Dissolved out by ether or benzine, and left as a residue on evaporation of the solvent.
Ammonium Bromide	Potassium bromide, or other non-volatile bodies.	Leaves a residue when heated.
	Ammonium chloride.	Same as for chlorides in ammonia.
Pyrogallic Acid	Powdered glass.	Left behind on solution.
Potassium Iodide	Potassium bromide.	The crystals of bromide are usually more transparent than those of iodide, but no reliance can be placed on this.
Silver Nitrate	Potassium nitrate, sometimes present in the fused sticks, not in the crystals.	Will not yield the full quantity of chloride on precipitation with HCl. Gives a purple color to flame.
Calcium Chloride	Calcium hydrate.	The clear filtered solution made with distilled water is alkaline to test paper, and gives a precipitate on breathing into it through a tube.
Pure (?) Chemicals generally.	Broken glass, bits of straw, wood, paper, &c.	These impurities either float or sink on the solution, and may easily be seen.

G. M. Jones.

ELSDEN'S TABLE OF POISONS AND ANTIDOTES.

	Poisons.	Remarks.	Characteristic Symptoms.	Antidote.
Vegetable Acids.	Oxalic Acid, including Potassium Oxalate.	1 dram is the smallest fatal dose known.	Hot, burning sensation in throat and stomach; vomiting, cramps, and numbness.	Chalk, whiting or magnesia, suspended in water. Plaster or mortar can be used in emergency.
Caustic Alkalies.	Ammonia. Potash. Soda.	Vapor of ammonia may cause inflammation of the lungs.	Swelling of tongue, mouth, and fauces; often followed by stricture of the œsophagus.	Vinegar and water.
Metallic Salts.	Mercuric Chloride.	3 grains the smallest known fatal dose.	Acrid, metallic taste, constriction and burning in throat and stomach, followed by nausea and vomiting.	White and yolk of raw eggs with milk. In emergency, flour paste may be used.
	Acetate of Lead.	The sub-acetate is still more poisonous.	Constriction in the throat and at pit of stomach; crampy pains and stiffness of abdomen; blue line round the gums.	Sulphates of soda or magnesia. Emetic of sulphate of zinc.
	Cyanide of Potassium.	*a.* Taken internally, 3 grs. fatal.	Insensibility, slow, gasping respiration, dilated pupils, and spasmodic closure of the jaws.	No certain remedy; cold affusion over the head and neck most efficacious.
		b. Applied to wounds and abrasures of the skin.	Smarting sensation.	Sulphate of iron should be applied immediately.
	Bichromate of Potassium	*a.* Taken internally. *b.* Applied to slight abrasions of the skin.	Irritant pain in stomach, and vomiting. Produces troublesome sores and ulcers.	Emetics and magnesia, or chalk.
	Nitrate of Silver.		Powerful irritant.	Common salt to be given immediately, followed by emetics.
Concentrated Mineral Acids.	Nitric Acid.	2 drams have been fatal. Inhalation of the fumes has also been fatal.	Corrosion of windpipe and violent inflammation.	Bicarbonate of soda, or carbonate of magnesia or chalk, plaster of the apartment beaten up in water.
	Hydrochloric Acid.	¼ ounce has caused death.		
	Sulphuric Acid.	1 dram has been fatal.		

Acetic Acid, concentrated, has as powerful an effect as the mineral acids.

Iodine.	Variable in its action; 3 grains have been fatal.	Acrid taste, tightness about the throat, vomiting.	Vomiting should be encouraged, and gruel, arrowroot and starch given freely.
Ether.	When inhaled.	Effects similar to chloroform.	Cold affusion and artificial respiration.
Pyrogallol.	2 grains sufficient to kill a dog.	Resemble phosphorus poisoning.	No certain remedy. Speedy emetic desirable.

ACKLAND'S TABLES FOR THE SIMPLIFICATION OF EMULSION CALCULATIONS.

No. 1.

	Equivalent weights.	Weight of $AgNO_3$ required to convert one grain of soluble haloid.	Weight of soluble haloid required to convert one grain $AgNO_3$	Weight of silver haloid produced by one grain of soluble haloid.	Weight of soluble haloid required to produce one grain of silver haloid.	Weight of silver haloid produced from one grain $AgNO_3$.
Ammonium bromide.......	98	1.734	.576	1.918	.521	1.106
Potassium "	119.1	1.427	.700	1.578	.633	
Sodium "	103	1.650	.606	1.825	.548	
Cadmium " com. ..	172	.988	1.012	1.093	.915	
" " anh....	136	1.25	.800	1.382	.723	
Zinc "	112.1	1.509	.663	1.670	.600	
Ammonium chloride.......	53.5	3.177	.315	2.682	.373	.844
Sodium "	58.5	2.906	.344	2.453	.408	
Ammonium iodide.........	145	1.172	.853	1.620	.617	1.382
Potassium "	166.1	1.023	.977	1.415	.707	
Sodium "	150	1.133	.882	1.566	.638	
Cadmium "	183	.929	1.076	1.284	.778	

Table No. 1 presents the actual weights of haloid or silver, as the case may be, required to convert or combine with one grain of another.

In order to make (say) ten ounces of emulsion by a new formula, which, for the sake of showing the working of the table, we will write down as follows :

Bromide of potassium....................................	150 grains.
Iodide of potassium..	10 "
Chloride of ammonium......................................	10 "
Gelatine..	200 "

we want to know how much silver nitrate should be employed in sensitizing this mixture. For this purpose we use the first column, in which we find against each haloid the exact quantity of silver nitrate required to fully decompose one grain. Taking, then, the figures we find in column No. 1 against the three salts in the above formula, and multiplying them by the number of grains of each used, we have the following sum :

Potassium bromide......................	$150 \times 1.427 = 214$	Weight silver nitrate required.
" iodide......	$10 \times 1.023 = 10.23$	
Chloride of ammonium.....	$10 \times 3.177 = 31.77$	

or the total quantity of silver nitrate required for full conversion, 256.00 grains.

TABLE SHOWING COMPARATIVE VALUE OF ALKALINE CARBONATES IN DEVELOPERS.

O. G. MASON.

COMMERCIAL NAME.	Chemical Symbol.	Molecular Weight.	The Commercial Salt contains of the pure Salt about	100 parts of 36 per cent Acetic Acid Require for Saturation.	Solubility in Water (approximate).
Soda, Caustic	$NaHO$	40	80 to 92%	26.66 p'rts of 90% Soda	1 part in 2
Sodium Carbonate, Carbonate of Soda, Sal Soda, Crystals,	$Na_2CO_3.10H_2O$	286	96 to 98%	89.38 " 96% "	1 " 2
The same, anhydrous or in dry powder	Na_2CO_3	106	About 98 to 99%	89.38 of 98 to 99% dry Sal Soda.	1 " 6
Sodium Bicarbonate, Bicarbonate of Soda, "Sesqui-carbonate of Soda,"	$NaHCO_3$	84	98 to 100%	50.91 of 99% Bicarb. Soda.	1 " 12

Equal work is done by 80 parts of Caustic Soda, 286 parts of Sal Soda (crystals), 106 parts of Sal Soda (dry), 168 parts of Bicarbonate of Soda. These quantities must be increased to make up for any impurity contained in the sample being used; for this purpose the usual percentage of impurity given in the above table may be assumed for all ordinary photographical uses.

COMMERCIAL NAME.	Chemical Symbol.	Molecular Weight.	The Commercial Salt contains of the pure Salt about	100 parts of 36 per cent Acetic Acid Require for Saturation.	Solubility in Water (approximate).
Potassa (Caustic Potash)	KHO	56	80 to 95%	37.33 parts of 90% Potassa.	1 part in 1
Potassium Carbonate, Carbonate of Potassa, Sal Tartar, Saleratus,	$K_2CO_3.1\frac{1}{2}H_2O$	165	76 to 96% Usually about 81%	51.11 parts of 81% Carb. Potassa.	1 " 1
Potassium, Carbonate, dry	K_2CO_3	140	About 95%	122.74 parts of 95% Carb. Potassa.	1 " 1
Potassium Bicarbonate, Bicarbonate of Potassa,	$KHCO_3$	100	100%	60 parts of 100% Bicarb. Potassa.	1 " 4

Equal work is done by 112 parts Caustic Potassa, 165 parts (about) ordinary Carbonate Potassa, 200 parts of Bicarbonate Potassa. These quantities must be increased in proportion to impurities, as noted in case of Soda These two alkalies are interchangeable for doing the same amount of work when *pure*, and when the one named in a given formula can not be obtained the table may assist in choosing a substitute of proper strength and solubility.

Dry or anhydrous Carbonate of Potassium is not usually found in the market.

COMPARISON OF EIKONOGEN DEVELOPERS FOR RAPID EXPOSURES.

REDUCED TO ONE OUNCE OF PREPARED DEVELOPER.

BY C. W. GRANT.

No.	Water.	Eiko.	Sulph. Sodium.	Carb. Pot.	Remarks.
	1 oz.	Grs.	Grs.	Grs.	
1	480 m.	7.3	43.7	10.9	*American Amateur Photographer*, Aug. 1890, p. 303.
					By Seed Dry Plate Co. *
2	"	8.3	22	11	" Cramer Dry Plate Co. *
3	"	5.5	11	11	" Harvard " " *
4	"	16	64	16	" Gottheil. AM. ANN., 1890, p. 269.‡‡
5	"	16	32	16	" W. H. Rau.† AM. ANN., 1890, p. 225.
6	"	6	30	12A	" Allen & Rowell.††
7	"	12	32	12	" Eagle D. P. Works.
8	"	6	24	16	" U. S. Supply Co.
9	"	6	12	9B	" John Nicol.** AM. ANN., 1890, p. 41.
10	"	12	24	8	" F. C. Beach.‡
11	"	6	28	9C	" *Photo. Times*.***
12	"	5	30	5	" Chautauqua School.
Totals.	5760	106.1	352.7	135.9	Divide by 12—Equals Average.
No. 1	480 m.	8.8	29.4	11.3	Average.
No. 2	480 m.	9.5	29.4	12.2	Average, Nos. 1 to 10 inclusive.
.....	480 m.	12	32	12	Recommended.

Allen & Rowell furnished the following formula for use with their slide plates, and can attest its efficiency, and I use it exclusively for slides and bromide prints, but substitute carb. pot. for c. soda.

Water to make	1 ounce
Sulph. Soda (cryst.)	18 grains
Eiko	3 grains
Quinol	3 grains
Carb. Soda	18 grains
Carb. Lithium	3 grains

* These were taken from an article by Mr. F. C. Beach.

‡‡ Herr Gottheil gives Carb. Pot. (as above) for rapid exposures.

† Mr. Rau considers Eiko. with Carb. *Soda*, inferior to Pyro.

‡ Mr. Beach considers Carb. Pot. more powerful than Carb. Soda, and less liable to cause stains. Confirmed by Gottheil, Rau, Nos. 1, 2, 3, 4, 5, 7, 8, 10, 12, and by compiler.

††—A. Given as 24 grs. Carb Soda.

***—C. Given as 17 grs. Carb. Soda. Not stated if for rapid exposures.

**—B. Given as 9 grs. Carb. Soda.

AMERICAN, FRENCH, ENGLISH AND GERMAN MONEY.

American.	French.	English.	German.	American.	French.	English.	German.
dols. c.	*fr. c.*	*s. d.*	*m. pf.*	*dols. c.*	*fr. c.*	*s. d.*	*m. pf.*
0 01	0 05	0 0¼	0 04		2 87.5		2 30
0 02	0 10	0 1	0 08	0 56	2 92	2 4	
	0 12.5		0 10		**3 00**		**2 40**
0 03	0 15	0 1½	0 12	0 58	3 02	2 5	
	0 20		0 16	**0 60**	**3 12.5**	**2 6**	**2 50**
0 04	0 21	0 2		0 62	3 23	2 7	
	0 25		0 20		3 25		2 60
0 05	**0 26**	**0 2½**		0 64	3 33	2 8	
0 06	0 31	0 3	0 25		3 37.5		2 70
	0 37.5		0 30	0 66	3 44	2 9	
0 08	0 42	0 4			3 50		2 80
	0 50		0 40	0 68	3 54	2 10	
0 10	0 52	0 5			3 62 5		2 90
0 12	**0 62.5**	0 6	**0 50**	0 70	3 65	2 11	2 92
0 14	0 73	0 7		**0 72**	**3 75**	**3 0**	**3 00**
	0 75		0 60	0 74	3 85	3 1	3 08
0 16	0 83	0 8			3 87.5		3 10
	0 87.5		0 70	0 76	3 96	3 2	
0 18	0 94	0 9			**4 00**		**3 20**
	1 00		**0 80**	0 78	4 06	3 3	
0 20	1 04	0 10			4 12.5		3 30
	1 12.5		0 90	**0 80**	4 17	3 4	
0 22	1 15	0 11			4 25		3 40
0 24	**1 25**	**1 0**	**1 00**	0 82	4 27	3 5	
0 25	1 30	1 0½	1 04	**0 84**	**4 37.5**	**3 6**	**3 50**
0 26	1 35	1 1	1 08	0 86	4 48	3 7	
	1 37.5		1 10		4 50		3 60
0 28	1 46	1 2		0 88	4 58	3 8	
	1 50		1 20		4 62.5		3 70
0 30	1 56	1 3		0 90	4 69	3 9	
	1 62.5		1 30		4 75		3 80
0 32	1 67	1 4		0 92	4 79	3 10	
	1 75		1 40		4 87.5		3 90
0 34	1 77	1 5		0 94	4 90	3 11	
0 36	**1 87.5**	**1 6**	**1 50**	**0 96**	**5 00**	**4 0**	**4 00**
0 38	1 98	1 7		1 00	5 21	4 2	4 16
	2 00		1 60	1 20	6 25	5 0	5 00
0 40	2 08	1 8		1 44	7 50	6 0	6 00
	2 12.5		1 70	1 68	8 75	7 0	7 00
0 42	2 19	1 9		1 92	10 00	8 0	8 00
	2 25		1 80	2 16	11 25	9 0	9 00
0 44	2 29	1 10		2 40	12 50	10 0	10 00
	2 37.5		1 90	2 64	13 75	11 0	11 00
0 46	2 40	1 11	1 92	2 88	15 00	12 0	12 00
0 48	**2 50**	**2 0**	**2 00**	3 84	20 00	16 0	16 00
0 50	2 60	2 1	2 08	4 80	25 00	20=£1	20 00
	2 62.5		2 10	9 60	50 00	£2	40 00
0 52	2 71	2 2		14 40	75 00	£3	60 00
	2 5		2 20	19 20	100 00	£4	80 00
0 54	2 81	2 3		24 00	125 00	£5	100 00

STANDARD OF FOREIGN COINS FOR CUSTOMS PURPOSES

As Proclaimed by the Director of the United States Mint, January 1, 1890, and Corrected to Date.

The Value of Imports for the Assessment of Duties is ascertained by converting Currency of Invoice into Money of the United States, as per following Table:

Country.	Unit of Currency.	Sign.	Value in U. S. Cur.
Argentine Republic	Peso =100 Centavos	$	.96.5
Austria-Hungary	Florin =100 Kreutzer	Fl.	.34.5
Azores	Milreis =100 Reis	Rs. $	.83.5
Belgium	Franc =100 Centimes	Frs.	.19.3
Bolivia	Boliviano =10 Reales	$	.69.8
Brazil	Milreis =1000 Reis	Rs. $	.54.6
British North America. *Ex. Newfoundland*	Dollars =100 Cents	$	1.00
Chili	Peso =100 Centavos	$	.91.2
China (*Haikwan*)	Tael =10 Mace	Tael.	1.14.8
Columbia, U. S. of	Peso =100 Centavos	$	.69 8
Costa Rica	Peso =100 Centavos	$	.69.8
Cuba	Peso =100 Centavos	$	.92.6
Denmark	Krone =100 Ore	Kr.	.26.8
Ecuador	Sucre =100 Centavos	$	.69.8
Egypt	Pound =100 Piastres	£	4.94.3
France	Franc =100 Centimes	Frs.	.19.3
Germany	Mark =10 Pfennige	Mks.	.23.8
Great Britain	Pound Sterling =20 Shillings	£	4.86.65
Greece	Drachma =100 Lepta	Dr.	.19.3
Guatemala	Peso =100 Centavos	$	.69.8
Hayti	Gourde =100 Cents	$	.69.5
Honduras	Peso =100 Centavos	$	.69.8
India	Rupee =16 Annas	Rs.	.33.2
Italy	Lira =100 Centesimi	L.	.19.3
Japan	Yen =100 Sen Gold	Yen.	.99.7
do	do. = do. Silver	Yen.	.75.2
Liberia	Dollar =100 Cents	$	1.00
Mexico	Peso =100 Centavos	$	.75.8
Netherlands	Florin =100 Cents	$	.40.2
Newfoundland	Dollar =100 Cents	$	1.01.4
Nicaragua	Peso =100 Centavos	$	.69.8
Norway	Krone =100 Ore	Kr.	.26.8
Paraguay	Peso =100 Centavos	$	1.00
Peru	Sol =100 Centavos	$	.69.8
Porto Rico	Peso =100 Centavos	$	.92.5
Portugal	Milreis =1000 Reis	Rs. $	1.08
Russia	Rouble =100 Copecks	S. Ro.	.55.8
Salvador	Peso =100 Centavos	$	.69.8
Sandwich Islands	Dollar =100 Cents	$	1.00
Spain	Peseta =100 Centimos	Ptas.	.19.3
Sweden	Krone =100 Ore	Kr.	.26.8
Switzerland	Franc =100 Centimes	Frs.	.19.3
Tripoli	Mahbub =20 Piastres.	$	.62.9
Tunis	Piastre =16 Caroubs	Ptrs.	.11.8
Turkey	Piastre =30 Paras,	Ptrs.	.04.4
Uruguay	Patacon =100 Centavos	$	.94.9
Venezuela	Bolivar =100 Centimos	Brs.	.14

USUAL SIZES OF FRENCH AND ITALIAN DRY PLATES.

French.	Inches.	Italian.	Inches.
6½x 9 Centimetres	2.5x 3.6	9x12 Centimetres	3.6x 4.7
9 x12 "	3.6x 4.7	12x16 "	4.7x 6.3
12 x15 "	4.7x 5.9	12x18 "	4.7x 7.2
13 x18 "	5.1x 7.0	13x18 "	5.1x 7.0
12 x20 "	4.7x 7.8	12x20 "	4.7x 7.8
15 x21 "	5.9x 8.2	18x24 "	7.0x 9.4
15 x22 "	5.9x 8.6	21x27 "	8.2x10.6
18 x24 "	7.2x 9.4	24x30 "	9.4x11.8
21 x27 "	8.2x10.6	27x33 "	10.6x12.9
24 x30 "	9.4x11.8	30x36 "	11.8x14.1
27 x33 "	10.6x12.9	40x50 "	15.7x19.6
27 x35 "	10.6x13.7	50x60 "	19.6x23.6
30 x40 "	11.8x15.7		
40 x50 "	15.7x19.6		
50 x60 "	19.6x23.6		

SIZES OF GLASS, MOUNTS, PAPER, ETC.

Petite cards	1⅝x3⅛
One-ninth plate	2 x2½
One-sixth plate	2¾x3¼
One-fourth plate	3¼x4¼
Half plate	4½x6½ and 4¼x6½
Half plate (English)	4¾x6½
Whole plate (4–4)	6½x8½
Extra 4–4	8 x10

Other sizes are expressed by inches.

Sizes of Mounts.

Stereoscopic 3½x7, 4x7, 4¼x7, 4½x7, 5x8

Victoria	3¼x5	Minette	1½x2⅜
Imperial	7⅞x9⅞	Card	2½x4⅛
Boudoir	5¼x8½	Cabinet	4¼x6½
Panel	4 x8¼	Promenade	4⅛x7⅛

Sizes of Albumen Paper.

18x22¾, 20½x24½, 22x36, 26x40, 27x42.

Size of blotting paper 19x24

FREEZING MIXTURES.

Parts. Reducing the Temperature	From Degrees of the Celsius	To Thermometer.
3 Nitrate of sodium + 4 Water	+13.2 deg.	— 5.3 deg.
9 Phosphate of sodium + 4 dilute Nitric acid	+10 "	—9 "
3 Sulphate of sodium + 2 dilute Nitric acid	+10 "	—10 "
1 Nitrate of sodium + 4 Water	....	—10.6 "
1 Chloride of potassium + 4 Water	....	—11.8 "
5 Sal ammoniac + 5 Saltpetre + 16 Water	+10 deg.	—12 "
1 Nitrate of ammonia + 1 Water	+10 "	—15.5 "
8 Sulphate of sodium + 5 conc. Sulphuric acid	+10 "	—17 "
1 Sulphocyanate of Potass. + 1 Water	+18 "	—21 "
1 Chloride of sodium + 3 Snow	....	—21 "
1 Sal ammoniac + 1 Saltpetre + 1 Water	+ 8 deg.	—24 "
3 Crystal. chloride of calcium + 1 Snow	....	—36 "
1 Snow + 1 dilute Sulphuric acid	— 5 deg.	—41

U. S. PATENT OFFICE PROCEDURE.

PATENTS are issued in the name of the United States, and under the seal of the Patent Office to any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement thereof, not known or used by others in this country, and not patented or described in any printed publication in this or any foreign country, before his invention or discovery thereof, and not in public use or on sale for more than two years prior to his application, unless the same is proved to have been abandoned; and by any person who, by his own industry, genius, efforts, and expense, has invented and produced any new and original design for a manufacture, bust, statue, alto-relievo, or bas-relief; any new and original design for the printing of woolen, silk, cotton, or other fabrics, any new and original impression, ornament, pattern, print, or picture to be printed, painted, cast, or otherwise placed on or worked into any article of manufacture; or any new, useful, and original shape or configuration of any article of manufacture, the same not having been known nor used by others before his invention or production thereof, nor patented nor described in any printed publication, upon payment of the fees required by law and other due proceedings had.

Joint inventors are entitled to a joint patent; neither can claim one separately. Independent inventors of distinct and independent improvements in the same machine can not obtain a joint patent for their separate inventions; nor does the fact that one furnishes the capital and another makes the invention entitle them to make application as joint inventors; but in such case they may become joint patentees.

Every patent contains a grant to the patentee, his heirs or assigns, for the term of seventeen years, of the exclusive right to make, use, and vend the invention or discovery throughout the United States and the Territories, referring to the specification for the particulars thereof.

If it appear that the inventor, at the time of making his application, believed himself to be the first inventor or discoverer, a patent will not be refused on account of the invention or discovery, or any part thereof, having been known or used in any foreign country before his invention or discovery thereof, if it had not been before patented or described in any printed publication.

Letters Patent granted a foreign government will not while in force prevent the inventor from obtaining a patent in the United States, unless the invention shall have been introduced into public use into the United States more than two years prior to the application. But every patent granted for an invention which is the subject of Letters Patent still in force and previously granted to the same inventor in a foreign country will be so limited as to expire at the same time with such foreign patent, or, if there be more than one, at the same time with the one having the shortest unexpired term, but in no case will it be in force more than seventeen years.

APPLICATIONS.

Application for a patent must be made in writing to the Commissioner of Patents. The applicant must also file in the Patent Office a written description of the same, and of the manner and process of making, constructing, compounding, and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct, compound and use the same; and in case of a machine, he must explain the principle thereof, and the best mode in which he has contemplated applying that principle, so as to distinguish it from other inventions, and particularly point out and distinctly claim the part, improvement, or

combination which he claims as his invention or discovery. The specification and claim must be signed by the inventor and attested by two witnesses.

The applicant shall make oath that he verily believes himself to be the original and first inventor or discoverer of the art, machine, manufacture, composition, or improvement for which he solicits a patent; that he does not know and does not believe the same was ever before known or used, and shall state of what country he is a citizen. Such oath may be made before any person within the United States authorized by law to adminster oaths, or, when the applicant resides in a foreign country, before any minister, charge d'affaires, consul, or commercial agent, holding commission under the Government of the United States, or before any notary public of the foreign country in which the applicant may be.

When the nature of the case admits of drawings, the applicant must furnish one copy signed by the inventor or his attorney in fact, and attested by two witnesses, to be filed in the Patent Office. In all cases which admit of representation by model, the applicant, if required by the commissioner, shall furnish a model of convenient size to exhibit advantageously the several parts of his invention or discovery.

On the filing of such application and the payment of the fee required by law, if on such examination, it appears that the claimant is justly entitled to a patent under the law, and that the same is sufficiently useful and important, the commissioner will issue a patent therefor.

Assignments.

Every patent or any interest therein shall be assignable in law by an instrument in writing; and the patentee or his assigns or legal representatives may, in like manner, grant and convey an exclusive right under his patent to the whole or any specified part of the United States.

Reissues.

A reissue is granted to the original patentee, his legal representatives, or the assignees of the entire interest when, by reason of a defective or insufficient specification, or by reason of the patentee claiming as his invention or discovery more than he had a right to claim as new, the original patent is inoperative or invalid, provided the error has arisen from inadvertence, accident, or mistake, and without any fraudulent or deceptive intention. The applications must be made and the specification sworn to by the inventors, if they be living.

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A caveat under the patent law, is a notice given to the office of the caveator s claim as inventor, in order to prevent the grant of a patent to another for the same alleged invention upon an application filed during the life of the caveat without notice to the caveator.

Any citizen of the United States who has made a new invention or discovery, and desires further time to mature the same, may, on payment of a fee of ten dollars, file in the Patent Office a caveat setting forth the object and the distinguishing characteristics of the invention, and praying protection of his right until he shall have matured his invention. Such caveat shall be filed in the confidential archives of the office and preserved in secrecy, and shall be operative for the term of one year from the filing thereof.

An alien has the same privilege, if he has resided in the United States one year next preceding the filing of his caveat, and has made oath of his intention to become a citizen.

The caveat must comprise a specification, oath, and, when the nature of the case admits of it, a drawing, and, like the application, must be limited to a single invention or improvement.

FEES.

Fees must be paid in advance, and are as follows: On filing each original application for a patent, $15. On issuing each original patent, $20. In design cases: For three years and six months, $10; for seven years, $15; for fourteen years, $30. On filing each caveat, $10. On every application for the reissue of a patent, $30. On filing each disclaimer, $10. For certified copies of patents and other papers, including certified printed copies, ten cents per hundred words. For recording every assignment, agreement, power of attorney, or other paper, of three hundred words or under, $1; of over three hundred and under one thousand words, $2; of over one thousand words, $3. For copies of drawings, the reasonable cost of making them.

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No copyright is valid unless notice is given by inserting in every copy published, on the title-page or the page following, if it be a book; or, if a map, chart, musical composition, print, cut, engraving, photograph, painting, drawing, chromo, statue, statuary, or model or design intended to be perfected as a work of the fine arts, by inscribing upon some portion thereof, or on the substance on which the same is mounted, the following words, viz.: "*Entered according to act of Congress, in the year* ——, *by* ——, *in the office of the Librarian of Congress, at Washington*," or, at the option of the person entering the copyright, the words: "*Copyright*, 18—, *by*——.'

The law imposes a penalty of $100 upon any person who has not obtained copyright who shall insert the notice "*Entered according to act of Congress*," or "*Copyright*," etc., or words of the same import, in or upon any book or other article.

Translations and Dramatizations.

Any author may reserve the right to translate or dramatize his own work. In this case notice should be given by printing the words "*Right of translation reserved*," or "*All rights reserved*," below the notice of copyright entry, and notifying the Librarian of Congress of such reservation, to be entered upon the record.

Since the phrase *all rights reserved* refers exclusively to the author's right to dramatize or to translate, it has no bearing upon any publications except original works, and will not be entered upon the record in other cases.

Duration of Copyright.

The original term of copyright runs for twenty-eight years. *Within six months before* the end of that time, the author or designer, or his widow or children, may secure a renewal for the further term of fourteen years, making forty-two years in all. Applications for renewal must be accompanied by explicit statement of ownership, in the case of the author, or of relationship, in the case of his heirs, and must state definitely the date and place of entry of the original copyright. Advertisement of renewal is to be made within two months of date of renewal certificate, in some newspaper, for four weeks.

Assignments.

A copyright is assignable in law by any instrument of writing, but such assignment must be recorded in the office of the Librarian of Congress within sixty days from its date. The fee for this record and certificate is one dollar, and for a certified copy of any record of assignment, one dollar.

Serials or Separate Publications.

In the case of books published in more than one volume, or of periodicals published in numbers, or of engravings, photographs, or other articles published with variations, a copyright is to be entered for each volume or part of a book, or number of a periodical, or variety, as to style, title, or inscription of any other article. But a book published serially in a periodical under the same general title, requires only one entry. To *complete* the copyright on such a work, two copies of each serial part, as well as of the complete work (if published separately), must be deposited.

Works of Art.

To secure a copyright for a painting, statue, or model or design intended to be perfected as a work of the fine arts, so as to prevent

infringement by copying, engraving, or vending such design, a definite description must accompany the application for copyright, and a photograph of the same, at least as large as "cabinet size," should be mailed to the Librarian of Congress within ten days from the completion of the work or design.

Copyrights cannot be secured through the Librarian of Congress upon trade-marks, nor upon mere names of companies or articles, nor upon prints or labels intended to be used with any article of manufacture. If protection for such names or labels is desired, application must be made to the Patent Office, where they are registered at a fee of $6 for labels and $25 for trade-marks. The trade-marks and labels are, however, protected without registration throughout most of the States.

RECORD OF PHOTOGRAPHIC PATENTS.

ISSUED BY THE UNITED STATES PATENT OFFICE FROM OCTOBER 1, 1889, TO OCTOBER 14, 1890, INCLUSIVE, WITH NAME OF PATENTEES.

COMPILED BY F. C. BEACH.

412,094.—Photographic Printing Frame.
G. A. JAMES, San Francisco, Cal.
412,462.—Photographic Burnisher.
CLARENCE R. CARLEY, Syracuse, N. Y.
412,511.—Vignetting Frame.
JOHN MCKELLUM, Kokomo, Ind.
412,682.—Photographic Plate-Holder.
JOSEPH THORPE, Jersey City, N. J.
412,953.—Photographic Mount.
H. N. GALE, Bristol, Conn.
413,106.—Making Photographic Pictures.
W. H. STAUFFER, Asbury Park, N. J.
11,034.—(*Re-issue*)—Photographic Developing Bath.
CHARLES SPIRO, New York.
413,474.—Combined Plate-Holder and Receiver.
C. C. BALSTON, Brooklyn, N. Y.
413,611.—Photographic Vignetter.
A. W. CLARK, St. Louis, Mo.
413,801.—Photographic Camera.
C. W. EDDY, Ware, Mass.
414,015.—Machine for Coating Glass and Other Surfaces with Photographic Emulsions.
J. W. T. CADETT, Ashtead, County of Surrey, Eng.
414,171.—Photographic Cabinet.
S. G. SHERWOOD, Buffalo, N. Y.
414,735.—Roll-Holder for Photographic Film.
THOMAS TAYLOR, Glasgow, Eng.
414,811.—Vignetting Attachment for Printing Frames.
S. D. HARVEY, Tipton, Ind.
415,040.—Telescope Objective.
C. S. HASTINGS, New Haven, Conn.
415,552.—Photographic Frame.
L. H. ORR, Springfield, Mass.

415,556.—Method of Coating Celluloid Plates.
F. ROWELL, Boston, Mass.
415,713.—Photographic Frame.
G. W. GILBERT, Kendallville, Ind.
415,942.—Album Leaf.
B. FUCHS, Rawitsch, Prussia, Germany.
416,290.—Apparatus for Exhibiting Panoramic Views and the Like.
R. ESCHE, Geneva, Switzerland.
416,295.—Picture Exhibitor.
G. KOBICH, New York.
416,440.—Photographic Camera-Shutter.
A. and L. CHRONIK, New York.
416,621.—Combined Photographic and Card File.
D. H. HOWD, Paterson, N. J.
416,650.—Photographic Camera.
C. P. STIRN, New York.
416,938.—Photographic Camera.
G. S. MOLER, Ithaca, N. Y.
417,045.—Photographic Camera Plate-Holder
M. JURNICK, Jersey City, N. J.
417,131.—Photographic Camera.
OSCAR ANSCHUTZ, Lissa, near Posen, Prussia, Germany.
417,153.—Photographic Burnishing Machine.
H. CRARY, Chicago, Ill.
417,202.—Manufacture of Flexible Photographic Films.
H. M. REICHENBACH, Rochester, N. Y.
417,263.—Photographic Apparatus for Holding and Exposing Sensitive Plates.
W. C. MERRILL and E. E. WINGO, Baltimore, Md.
417,422.—Magnesium Flash-Light Apparatus.
J. J. HIGGINS, New York.
417,863.—Camera Box.
J. W. FREEDLE, Cleveland, O.
417,871.—Photographic Camera.
H. LANEY, Cumberland, Md.
418,064.—Combined Plate-Holder and Printing Frame.
JOS. M. RHODES, Covington, Ind.
418,065.—Plate-Holder for Cameras.
JOS. M. RHODES, Covington, Ind.
418,318.—Camera Shutter.
T. O. HEGG, Madison, Wis.
418,343.—Photographic Camera.
CARL P. STIRN, New York, N. Y.
418,674.—Method of Manufacturing Transparent Patterns.
J. BAYNES, Winchester, N. Y.
418,675.—Direct Printed Adhesive Negative.
J. BAYNES, Winchester, N. Y.
418,764.—Photographic Camera.
C. R. SMITH, New York, N. Y.
419,006.—Camera Stand.
E. C. FISHER, Claremont, N. H.
419,105.—Photo-Plate Holder.
J. BARNETT, New York, N. Y.
419,360.—Photographic Printing Frame.
LOUIS ROUILLION, Ithaca, N. Y.
419,505.—Photographic Plate Holder and Mechanism for operating the same.
ALEXANDER DOM, Mt. Healthy, Ohio, and C. H. SHEEN, Cincinnati, Ohio.

419,910.—Photographic Camera.
L. M. BERTHON, the Castle of Asseiux, near Roussilon, Isere, France.
420,130.—Flexible Photographic Film.
W. H. WALKER and G. EASTMAN, Rochester. N. Y.
420,355.—Photographic Dipper,
E. W. PERRY, Jr., New York, N. Y.
421,266.—Album of Picture Exhibitor.
E. S. GLOVER, Battle Creek, Mich.
421,267.—Album Stand or Holder.
E. S. GLOVER, Battle Creek, Mich.
421,436.—Photographic Camera.
P. E. RUDELL, New York, N. Y.
421,484.—Camera and Electrical Flash-light Attachment.
G. E. DAVIS, Dubuque, Iowa.
421,923.—Photographic Camera.
H. N. B. GOOD, Devizes, County of Wilts, England.
422,143.—Photo Negative Bath.
J. R. MOELLER, Grand Island, Nebraska.
422,559.—Photographic Stand.
H. WILD, Zurich, Switzerland.
422,644.—Photographic Shutter.
J. R. TREGO, San Franscisco, Cal.
422,686.—Camera.
H. M. ALTICK, Dayton, Ohio.
422,709.—Photographic Camera.
W. A. BRICE, London, England.
422,825.—Photographic Camera Shutter.
E. W. PERRY, Jr., New York, N. Y.
422,984.—Photographic Camera.
A. W. SIMON, Akron, N. Y.
423,059.—Packing Box for Photographic Dry Plates.
E. LEAR, Chicago, Ills.
423,473.—Timing Apparatus for Photographers.
H. FORD, Lyndon, Kansas.
423,551.—Camera Stand.
E. C. FISHER, Claremont, N. H.
423,649.—Magazine for Photographic Cameras.
T. S. WILES, Albany, N. Y.
413,682.—Camera.
H. W. HALES, Ridgewood, N. J.
423,849.—Photo-Chemical Printing.
W. WILLIS, Bromley, England.
423,913.—Photographic Camera Shutter.
J. J. DOSSERT, New York.
424,146.—Photographic Camera.
D. J. TAPLEY, Newtown, N. Y.
424,315.—Photographic Apparatus.
E. KIPPER, Adams, Mass., and E. W. PERRY, Jr., New York, N. Y.
424,396.—Magazine Photographic Plate-holder.
T. S. WILES, Albany, N. Y.
424,402.—Camera.
W. H. BRISTOL, Hoboken, N. J.
19,737.—(*Design Patent*)—Photographic Album.
N. LOCHBAUM, Berlin, Germany.
424,564.—Photographic Camera.
W. B. LUCE, Boston, Mass.

Negative by John B. Gardiner,
with a Waterbury Detective Camera.

Photo-Electro Eng. Co., Engravers,
New York City.

OLD MILL ON THE BRONX RIVER

424,768.—Photographic Burnishing Machine.
W. G. ENTREKIN, Philadelphia, Pa.
424,857.—Holder for Photographic Plates.
P. CHOUTEAU, St. Louis, Mo.
425,005.—Photographic Magazine Camera.
F. H. D. SCHWARZ, St. Louis, Mo.
425,130.—Camera.
C. F. GETLER, Matteawan, N. Y.
425,306.—Printing Frame Support.
A. J. DAWDY, Goshen, Ind.
425,319.—Lamp for Use in Photographic Dark-rooms.
FRANK HAES, North Kensington, Middlesex County, England.
425,420.—Negative Holder.
E. GILLIS, Kalamazoo, Mich.
425,775.—Mount for Photographers.
H. N. GALE, Bristol, Conn.
425,812.—Vignetter,
H. J. LLOYD, Wyalusing, Penn.
425,958,—Device for Holding Sensitized Paper in contact with Negatives.
W. J. READ, Jr., Boston, Mass.
426,023.—Petroleum Lamp for Photographic Purposes.
M. JLJINSKY, Charlottenburg, Prussia, Germany.
426,054.—Photographic Negative Film Holder.
F. S. OSBORNE, Chicago, Ill.
426,283.—Plate-Holder for Mechanical Printing.
H. H. E. G. KOHL, Leipsic-Reundnitz, Germany.
426,295.—Photographic Camera.
J. MERRITT and W. E. SPENCER, Brooklyn, N. Y.
426,296.—Photographic Camera.
J. MERRITT and W. E. SPENCER, Brooklyn, N. Y.
426,411.—Apparatus for producing Instantaneous Flash Light.
A. HEMSLEY, Philadelphia, Penn.
426,420.—Photographic Dry Plate Coating Machine.
F. J. SWAINE, St. Louis, Mo., and C. S. MOODY, Woodland, Mo.
19,831.—(*Design Patent*)—Album Leaf.
E. G. THORP, Boston, Mass.
427,187.—Photographic or Laboratory Lamp.
H. G. RAMSPERGER, New York, N. Y.
427,321.—Camera Back-Piece.
J. F. HEIN, Boston, Mass.
427,322.—Plate Holder.
J. F. HEIN, Boston, Mass.
427,727.—Apparatus for Displaying Stereoscopic Views.
C. C. BISHOP, Nashville, Tenn.
427,766.—Means for Printing Backgrounds.
E. N. HOWE, Forest, Ohio.
427,778.—Camera.
J. A. MAILLOUX, Brookline, Mass.
427,937.—Burnisher.
S. O. TUERK, Syracuse, N. Y.
428,036.—Portable Dark-Room.
G. BAUSCH, Syracuse, N. Y.
428,448.—Camera.
T. H. BLAIR, Boston, Mass.

428,472.—Photo-Mechanical Printing Plate.
O. DUBOIS, Fall River, Mass.
428,483.—Method of Manufacturing Transparent Relief Pictures.
W. HAGELBERG, Berlin, Germany.
428,797.—Roll-Holder for Cameras.
T. H. BLAIR, Boston, Mass.
428,809.—Photographic Plate-Holder.
W. H. FULLER, Passaic, N. J.
429,558.—Oil Finish for Photographs.
A. C. BRENDECKE, Chicago, Ill.
429,705.—Automatic Photographic Apparatus.
M. J. STEFFENS, Chicago, Ill.
429,792.—Panoramic Photographic Camera.
P. MÖESSARD, Paris, France.
429,843.—Indelible Print on Picture.
F. C. COBERN and J. R. FRANCE, New York.
429,929.—Photographic Shutter.
W. B. LUCE, Brooklyn, N. Y.
430,114.—Magic Lantern.
J. B. COLT, New York.
430,115.—Lamp for Magic Lanterns.
J. B. COLT, New York.
430,242.—Photographic Print Washer.
J. F. WAY, Waterbury, Ct.
430,794.—Photographic Camera.
F. WHITNEY, Chicago, Ill.
20,000.—(*Design Patent*)—Photographic Album.
M. F. HARTE, Brooklyn, N. Y.
431,120.—Photographic Washing Apparatus.
J. L. MORRIS, Lawrence, Kansas.
432,255.—Camera Stand.
H. D. WAITE, Watertown, N. Y.
432,410.—Album.
C. JAEGER, New York, N. Y.
432,411.—Album.
C. JAEGER, New York, N. Y.
432,530.—Composite Heliochromy.
FRED. E. IVES, Philadelphia, Pa.
432,783.—Photo Engraving Apparatus.
W. A. BLOMGREN, Chicago, Ill.
432,903.—Apparatus for Automatically Photographing, Developing, and Delivering the Finished Pictures.
J. SACCO, Paris, France.
432,974.—Plate-Holder for Photographic Cameras.
W. F. CARLTON, Rochester, N. Y.
432,990.—Roll-Holder for Photographic Films.
GEORGE EASTMAN and P. H. YAWMAN, Rochester, N. Y.
432,999.—Photographic Shutter.
G. F. GREEN, Kalamazoo, Mich.
433,020.—Roll-Holder for Photographic Films.
S. D. MCKELLEN, Manchester, England.
433,070.—Camera.
E. R. BULLARD, Wheeling, W. Va.
433,333.—Support for Sun-Print Frames.
A. J. DAWDY, Goshen, Ind.
433,553.—Photographic Camera.
G. D. THOMPSON, Cincinnati, Ohio.

433,745.—Camera Shutter.
W. E. SCHNEIDER, Washington, D. C.
433,746.—Camera.
W. E. SCHNEIDER, Washington, D. C.
433,774.—Roll-Holder for Photographic Films.
G. EASTMAN and P. H. YAWMAN, Rochester, N. Y.
433,775.—Roll-Holder for Photographic Films.
G. EASTMAN, Rochester, N. Y.
433,963.—Photographic Camera.
W. SANDERS, Liverpool, England.
434,046.—Photographic Camera.
F. W. HUTCHINS, Warren, Ohio.
434,090.—Photographic Camera.
O. PLANL, Dresden, Germany.
434,188.—Photographic Printing Frame.
W. H. LEWIS, Huntington, N. Y.
434,451.—Photographic Mounting Machine.
L. C. MADSEN, Sleepy Eye, Minn.
434,622.—Device for making photographic camera beds rigid.
H. P. BALL, Philadelphia, Pa.
434,807.—Photographic Camera.
J. M. RHODES, Covington, Indiana.
435,056.—Photographic Posing Chair.
J. M. DOW.
435,080.—Camera.
W. R. Tobias, Perth Amboy, N. Y.
435,271.—Photographic Objective.
E. ABBE and P. RUDOLPH, Jena, Saxe-Weimar, Germany.
435,315.—Tripod.
J. R. MOELLER, Grand Island, Nebraska.
435,335.—Lens Tube for Photographic Apparatus.
W. H. TRUEMAN, Philadelphia, Penn.
435,342.—Photographic Camera.
J. E. BLACKMORE, Grand Rapids, Mich.
435,388.—Device for Exhibiting Pictures and Like Articles.
G. W. BOLTON, Milwaukee, Wis.
435,681.—Device for Oscillating Photographer's Developing Pans.
V. H. BUSCHMANN, Baltimore, Md.
435,884.—Flash Lamp.
H. CAMPBELL, Brooklyn, N. Y.
436,012.—Photographic Camera.
J. T. BEDFORD, New York, N. Y.
436,060.—Photographic Magazine Camera.
J. LALOR, Aurora, Ill.
436,098.—Photographic Camera.
H. HEINRICH, Berlin, Germany.
436,117.—Album.
W. BERGNER, Baltimore, Md.
436,243.—Easel Album.
T. KELLEY, New York, N. Y.
436,347.—Photographic Camera.
W. H. FULLER, Passaic, N. J.
436,391.—Photographic Camera.
W. I. ADAMS, Montclair, N. J.
436,404.—Photographic Shutter.
T. R. DALLMEYER, London, England, and F. BEAUCHAMP, Tottenham, England.

436,587.—Producing Photographic Films.
Y. SCHWARTZ, Hanover, Germany.
436,627.—Apparatus for Automatic Photography.
T. E. ENJALBERT, Paris, France.
436,658.—Photographic Camera Shutter Attachment.
H. W. HALES, Ridgewood, N. J.
436,687.—Photo-Engraving Frame.
J. BAYNES, Westchester, N. Y.
436,745.—Detective Camera.
M. A. SEED, St. Louis, Mo.
436,855.—Photographic Camera Shutter.
F. A. HETHERINGTON, Brooklyn, N. Y.
436,866.—Burnisher.
W. H. BOLES, Syracuse, N. Y.
437,063.—Method of Producing Line Drawings.
L. O. VINCENT, Pentwater, Michigan.
437,104.—Coin-Operated Photographic Apparatus.
C. H. C. FÖGE, C. H. GRIESE and J. L. F. RADERS, Hamburg, Germany.
437,170.—Producing Photo-mechanical Printing Plates.
R. Aramburo, Seville, Spain.
20,166.—(*Design Patent*)—Book or Album Leaf.
E. G. THORP, Boston, Mass.
437,290.—Photographic Camera.
A. E. COLGATE, New York.
437,629.—Photographing Without a Dark-Room.
CHARLES SPIRO, New York.
437,630.—Means for Filling Photographic Plate-Holders Without a Dark-Room.
CHARLES SPIRO, New York.
437,631.—Photographic Developing Apparatus.
CHARLES SPIRO, New York.
437,655.—Photographic Shutter.
W. H. LEWIS, Huntington, N. Y.
437,656.—Plate-Holder.
W. H. LEWIS, Huntington, N. Y.
437,843.—Photographic Printing Frame.
D. BARTLETT, Elizabeth, N. J.
437,949.—Mount for Photographs or other Pictures.
R. H. L. TALCOTT, Boston, Mass.
438,261.—Coin-Operated Photographing Machine.
P. V. W. WELSH, New York.
438,494.—Photographic Camera.
G. SHORKLEY, New York.

RATES OF DOMESTIC POSTAGE

TO ANY PART OF THE UNITED STATES, CANADA, OR MEXICO.

SEE NOTE H.

	cts.	oz.	See Spec'l Note.
Address Tags	1	1	*a*
Bill Heads	1	1	*a*
Blotters (printed)	1	1	*a*
Blue Prints	1	2	*d*
Books, printed	1	2	*d*
Cards, playing	1	1	*a*
" printed			
" business			
" Christmas, etc.	1	2	*a*
" Easter			
" New Year			
Chromos	1	2	*a*
Catalogues	1	2	*d*
Circulars	1	2	*d*
Coins	1	1	*a b*
Copy (MSS.)	2	1	*e*
" (with proof sheets)	1	2	*e*
Crayon	1	1	
Desk Blotters	1	1	*a*
Drawings / Designs (Pen or Pencil)	1	1	* *e*
Easter Cards	1	2	*a*
Engravings	1	2	*a*
Handbills	1	2	*a*
Letters	2	1	*e*
Labels (printed)	1	2	*a*
Lithographs	1	2	*a*
Manifold Letters	2	1	*e*
Manuscript	2	1	*e*
Magazines	1	4	*d*
Merchandise	1	1	*a b*
Maps (printed)	1	2	*e*
Newspapers	1	4	*d*
New Year Cards	1	2	
Packages, sealed	2	1	*b*

	cts.	oz.	See Spec'l Note.
Packages, unsealed	1	1	† *b*
Pamphlets	1	2	*d*
Patterns (cut)	1	1	*a*
Periodicals	1	4	*d*
PHOTOGRAPHS	1	2	*d*
Pictures (scrap)	1	2	
Playing Cards	1	1	*a*
Postal Cards	1	ea.	*f*
Printed Matter (*not merchandise or samples*)	1	2	*d*
Printed Envelopes	1	1	*a*
Prospectuses	1	2	*d*
Proof Sheets	1	2	*d g*
Plans (in writing)	2	1	*e*
Registration	10	ea.	*i*
Samples	1	1	*b*
Sample copies of regular publications mailed by publisher (second-class)	1	lb.	
Sample copies of regular publications not mailed by publisher	1	4	*a*
Scrap Pictures	1	2	*a*
Seeds, Plants, etc.	1	2	
Specie	1	1	*a b*
Stereoscopic Views	1	2	*d*
Tickets	1	2	*a*
Type Writer Work	2	1	*e*
Valentines (if printed without embellishment with silk, satin, etc.	1	2	*a*
Visiting Cards (printed)	1	2	*a*

* If pen or pencil drawings contain no written letters, figures, or words, they are 4th class matter, otherwise 1st class.

† May be either 3d or 4th class.

GENERAL NOTES.

Cards, circulars, catalogues, etc., relating to the business of one or more firms, and different articles of all kinds and classes, may be placed in the same package, provided that the highest rate of postage that any part of the contents is subject to shall be prepaid on the whole package.

The following articles are unmailable, and will not be dispatched in any case;—Spirituous, malt or vinous liquids, poisons, explosive matter, inflammable articles, live or dead animals, insects (except queen bees when safely secured), substances exhaling a bad odor, fresh fruits and vegetables, obscene or indecent books, prints, writings, or papers; all postal cards or letters on the envelopes of which lewd, obscene, or lascivious delineations, offensive duns, epithets, terms, or language are written or printed, all matter concerning lotteries or schemes devised and intended to defraud the public, or for the purpose of obtaining money under false pretences, and all mail matter not addressed to a post office or to no particular person, firm, company, or publication.

Special Delivery.—Any mail matter, when bearing, in addition to the regular postage, a "special delivery" stamp (face value ten cents). will be immediately delivered by special messenger on its arrival at destination, between the hours of 7 a.m. and 7 p.m., and within one mile from the post office, if it be not a letter-carrier office. At letter-carrier offices special delivery is obligatory within the carrier limits, and between the hours of 7 a.m. and 7 p.m.

Note A.

Fourth Class Matter.—Samples and Merchandise.—Weight limited to four pounds. Postage must be fully prepaid. Merchandise may have printing on it or on the wrapper. Written marks in addition to the address are allowed on Fourth Class matter, as follows:—The name and address of sender preceded by the word "From"; and any names, numbers, marks, or letters for the purpose of description. A request to the delivering Postmaster may also be written asking him to notify sender if the package is not delivered.

Note B.

Articles of the Fourth Class liable to injure or deface the mails, such as flour, sugar, glass, needles, nails, pens, etc., must first be placed in a bag, box or open envelope, which most then be enclosed in another outside tube or box, made of metal or hardwood without sharp corners or edges and having a sliding clasp or screw lid, thus securing the articles in a double package; if the articles are fragile, they must be packed with sawdust, cotton or other packing material in the inside pocket. Powdered articles such as flour, sugar, etc., must be enclosed in a transparent bag. Admissible liquids and oils (not exceeding 4 ounces liquid measure), pastes, salves or articles easily liquefiable, must conform to the following conditions: When in glass bottles or vials, such bottles or vials must be strong enough to stand the shock of handling in the mails, and must be enclosed in a wooden or papier-mache block or tube not less than three-sixteenths of an inch thick in the thinnest part, strong enough to support the weight of mails piled in bags and resist rough handling; and there must be provided between the bottle and its wooden base, a cushion of cork crumbs, cotton, felt, asbestos, or some other absorbent, sufficient to protect the glass from shock in handling; the block or tube impervious to liquids, including oils, etc,, to be closed by a tightly fitting screw-lid of

wood or metal, with a rubber or other pad so adjusted as to make the block or tube water-tight and to prevent the leakage of the contents in case of breaking of the glass. When enclosed in a tin cylinder, metal case or tube, such cylinder, case or tube should have a screw-lid with a rubber or cork cushion inside in order to make the same water-tight, and should be securely fastened in a wooden or papier-mache block (open only at one end) and not less in thickness and strength than above prescribed. Manufacturers or dealers, intending to transmit articles or samples in considerable quantities, should submit a sample package, showing their mode of packing, to the Postmaster at the mailing office who will see that the conditions of this section are carefully observed.

Note D.

Third Class Matter.—PREPAYMENT.—Postage must be fully prepaid, otherwise will be "held for postage." THE LIMIT OF WEIGHT IS four pounds, except on single books. WRITING.—No writing is permitted on Third Class matter except as follows: The name and address of the sender on the outside or inside of package, preceded by the word "From," and any printing not in the nature of personal correspondence. The sender is further allowed to mark a word or passage in a book or paper to which he desires to call special attention. He may also write a simple inscription or dedication upon the cover or blank leaf of a book or pamphlet. The date, address and signature of a circular may be written. Any other writing on Third Class matter will subject the package to letter rates of postage, and render the sender liable to a fine of Ten Dollars. PHOTOGRAPHS and BLUE PRINTS must bear no other writing than the name of the sender.

WRAPPING.—Mail matter of the Third Class must be so wrapped or enclosed that it can be readily examined without destroying the wrapper; otherwise it will be subject to postage at the First Class rate (two cents per ounce), as will all articles enclosed in sealed envelopes with clipped ends, sides or corners, or in boxes with covers secured by nails, and all packages the wrappers of which are secured to the enclosure by postage stamps.

Note E.

First Class.—This class includes letters, postal cards, sealed packages, all matter wholly or partly in writing (whether manuscript or produced by type-writer or copying press), drawings, designs, plans, and maps, if they contain descriptive words, letters, or figures in writing, produced by hand, manuscript for publication not accompanied by proof sheets, and all personal correspondence, whether in writing or in print. (See under heads "Third Class", "Fourth Class," notes "A" and "D," certain writing permitted in or on articles of those Classes.)

The rate of postage on mail matter of the First Class (sealed or unsealed) is TWO CENTS FOR EACH OUNCE OR FRACTION THEREOF, excepting postal cards, and excepting also letters for *local delivery* posted at the post office where no letter carriers are employed, in which case the rate is ONE CENT PER OUNCE OR FRACTION THEREOF.

The law provides that the postage on all mail matter of the First Class shall be prepaid only by postage stamps or by enclosure in government stamped envelopes, and that any article of this Class (not entitled by law to free transmission in the mails) deposited in a post office wholly unpaid or prepaid *less than one full rate, can not be forwarded or delivered*, but must be "held for postage." LIMIT OF WEIGHT.—There is no limit to the weight of letters or packages of First Class matter. WRAPPING OR ENCLOSURE.—Mail matter of the First Class may be wrapped or enclosed in

any manner that the sender may desire. RETURN.—Letters not delivered will be returned to writer free, if a request to that effect is placed on the envelope. FORWARDING.—A letter will be forwarded by the Postmaster who may hold it, to another post office at the request of the person to whom the letter is addressed. Letters addressed to the care of another person, or erroneously delivered, may be redirected and returned within a reasonable time to post office, and will be forwarded without additional charge.

The putting on of requests to return the matter to the sender in case of non-delivery is recommended by the Post Office Department—not on first-class matter alone, but on all matter.

Note F.

Postal Cards.—No cards are "Postal Cards" except those issued by authority of the Postmaster-General (the imitation of which is forbidden and punished by law); and so-called "Postal Cards" issued by private parties are subject to letter rates of postage when they contain any written matter whatever in addition to the date, and the name of the addressee and of the sender, and the correction of mere typographical errors therein. Nothing whatever may be attached to a Postal Card except an address label, which may be pasted to the *address side*, and no printing or writing is permitted upon the address side of postal cards, except that imprinted thereon at the manufactory and such as may be necessary for the proper direction of the same. Postal Cards are returned to the senders when unclaimed, but requests to so return should *not* be placed on the address side. Postal Cards are unmailable as such when incomplete or mutilated, and in all cases where any of the above conditions are not complied with.

Note G.

Proof Sheets may be corrected or uncorrected, with or without the original manuscript, additions to or alterations in the matter, or directions as to the typographical part of the work; but directions in writing as to binding, quality of paper, etc., are nor permissible unless the letter rate of postage be paid.

Note H.

Canada and Mexico.—Matter mailed in the United States, addressed to Mexico, is subject to the same postage rates and conditions as it would be if it were addressed for delivery in the United States, except that articles of miscellaneous merchandise (fourth-class matter) not sent as *bona fide* trade samples, are required to be sent by "Parcels Post," and that the following articles are *absolutely excluded* from the mails without regard to the amount of postage prepaid, or the manner in which they are wrapped, viz.:

All sealed packages, other than letters in their usual and ordinary form; *all* packages (including packages of second-class matter, which weigh more than four pounds six ounces) except such as are sent by "Parcels Post;" liquids, pastes, confections, and fatty substances; publications which violate any copyright law in Mexico.

Single volumes of printed books, *in unsealed* packages, are transmissible to Mexico in the regular mails without limit as to weight.

"*Commercial Papers*," and *bona-fide* trade samples are transmissible to Mexico in the regular mails at the postage rate given above, opposite "Commercial Papers" and "Samples of Merchandise," respectively. See also Note 15, pp. 815 and 816 of the GUIDE for January, 1890.

Matter mailed in the United States, addressed to Canada, is subject to the same postage rates and conditions as it would be if it were addressed

for delivery in the United States, except that "Commercial Papers," are transmissible at the postage rate given above opposite "Commercial Papers," and that the following articles are *absolutely excluded* from the mails, without regard to the amount of postage prepaid, or the manner in which they are wrapped, viz.:

All sealed packages, other than letters in their usual and ordinary form; *all* packages (except single volumes of printed books and packages of second-class matter), which weigh more than four pounds six ounces; *Police Gazettes;* publications which violate any copyright law of Canada.

Note I.

Registration.—All kinds of mail matter can be registered at the rate of ten cents for each package, to be fully prepaid by stamps, in addition to the postage at regular rates; all conditions as to marks, contents and method of securing packages being the same as described under the various classes (notes A, D, E). Each package must bear name and address of sender, and a receipt will be returned from the person to whom addressed.

Domestic Money Orders.

For sums	not	exceeding	$ 5	$0 05
"	"	"	10	08
"	"	"	15	10
"	"	"	30	15
"	"	"	40	20
"	"	"	50	25
"	"	"	60	30
"	"	"	70	35
"	"	"	80	40
"	"	"	100	45

The fee for a Postal Note is 3 cents.

A Postal Note may be drawn for any amount from one cent to four dollars and ninety-nine cents.

INTERNATIONAL MONEY ORDERS.

The fees for International Money Orders are as follows:

For sums not exceeding $10	$0 10
Over $10 and not exceeding $20	20
" 20 " " 30	30
" 30 " " 40	40
" 40 " " 50	50
" 50 " " 60	60
" 60 " " 70	70
" 70 " " 80	80
" 80 " " 90	90
" 90 " " 100	1 00

The sender of a money order must state the particulars thereof upon a form furnished by the post-office.

A money order may be endorsed once only.

The person who presents a money order for payment must be identified if unknown to the postmaster.

A domestic money order may be repaid within a year at the office of issue. The fee will not be refunded.

Duplicates of lost or invalid money orders are issued by the department free of charge upon application made through the issuing or paying postmaster by remitter, payee or indorsee.

The issue of money orders on credit is prohibited.

A money order may be paid to a second person by endorsement of payee, or upon a written order or power of attorney to be filed with the paying postmaster.

A duplicate cannot be obtained of a postal note lost or destroyed.

An invalid postal note, that is, one not paid within three months from the last day of month of issue, will be replaced at an extra charge of three cents, by a duplicate issued by the department, to be applied for through the postmaster at any money order office.

International money orders may be drawn for payment in the following countries:

Alexandria (Egypt), if drawn as a French order,
Algeria,
Beyroot, (Turkey),
Canada.
Cape Colony,
Constantinople, (Turkey),
France,
Gibraltar,
Great Britain and Ireland,
Hawaiian Islands,
Jamaica.
Leeward Islands,
Malta,
Newfoundland,
New South Wales,
New Zealand,
Queensland,
Salonica, (Turkey).
Smyrna, (Turkey),
Tasmania,
Tunis,
Windward Islands,

Order should be sent by remitter to payee.

Victoria, (Australia),

Alexandria (Egypt), if drawn as a British order,
Amoy, (China),
Austria—Hungary,
Azores,
Belgium,
Bermuda,
Canton, (China),
Ceylon,
Danish West Indies,
Denmark.

Order may be kept by remitter as a receipt.

Egypt,
Falkland Islands,
Foochow, (China),
Gambia, (Africa),
Germany,
Hankow, (China),
Hoihow, (China),
Hong Kong, (China),
Iceland,
India, (British),
Italy,
Japan,
Luxemburg, (Grand Duchy),
Madeira Islands,
Malacca, (Straits Settlements),
Mauritius,
Natal,
Netherlands,
Ningpo, (China),
Norway,
Penang, (Straits Settlements),
Portugal.
Saint Helena,
Shanghai, (China),
Singapore, (Straits Settlements),
South Australia,
Swatow, (China),
Sweden.
Switzerland,
Tangier, (Morocco).
Tobago,
Trinidad,
Western Australia,

Order may be kept by remitter as a receipt.

RATES OF POSTAGE TO FOREIGN COUNTRIES.

UNIVERSAL POSTAL UNION.

Treaty concluded at Berne, Switzerland, October 9th, 1874.

		Cts.
Letters, per 15 grams or ½ ounce (prepayment optional, except to places marked *)		5
Postal Cards, each		2
Newspapers and other printed matter, per 2 ounces		1
Commercial papers,	First 10 ounces or fraction thereof	5
	Every additional 2 ounces	1
Samples of merchandise,	First 4 ounces	2
	Every additional 2 ounces	1
Registration Fee on letters or other articles		10

All correspondence other than letters must be prepaid at least partially.

†Correspondence paid to British Indian Frontier only.

INTERNATIONAL MONEY ORDERS are issued only to Countries or Places marked ¶.

☞ **For Places not mentioned below, not in the Universal Postal Union, see Table page 411.**

COUNTRIES OR PLACES WHICH, WITH THE UNITED STATES, CANADA AND MEXICO, ARE COMPRISED IN THE UNIVERSAL POSTAL UNION.

(*The Italics in brackets represent the Nationality of Foreign Possessions.*)

Abyssinia, East Africa.
Aden, Arabia, British P. O.
Africa (W. C.) Br. Colonies.
Africa (Fr. Port. & Sp. pos.)
Ajuda, Africa (*Portuguese*)
Algeria, Africa. (*French.*)
Algiers, Africa. (*French.*)¶
Alhucemas, N. Africa. (*Sp.*)
Amar, Asia. (*Spanish*)
Amirante Islands, E. Africa.
Amoy, Hong Kong P. O.
Andorra, Rep. of (*Spain.*)
Angola, Africa. (*Portug'se.*)
Annobon Isl'd., Africa. (*Sp.*)
Antigua, Isl'd. W.I. (*British*)
Aracan, British India.
Argentine Republic.
Aruba, S. America. (*Dutch.*)
Asia (Dch., Fr., Pr. & Sp. Col.)
Aspinwall, U.S. of Colombia.
Assinie, Africa. (*French.*)
Austria-Hungary.¶
Azores Islands. (*Port.*)¶
Bahama Islands. (*British*)
Bakel, Africa. (*French.*)
Balearic Isles. (*Spanish*)
Bali, Asia. (*Dutch.*)
Banca, Asia. (*Dutch.*)
Barbadoes, W. I. (*British.*)¶
Barbary (Tunis & Tripoli.)
Batavia, Java, Asia. (*Dutch*)
Bay Islands, Sp. Honduras.
Belgium.¶
Bermuda Islds., W. I. (*Br*)
Bien Hoa. Coch.-China. (*Fr*)
Billiton, Asia. (*Dutch.*)
Bissao, Africa. (*Portug'se.*)
Bogota, U.S. of Colombia.
Bolivia, South America.
Bonaire Islds., W.I. (*Dutch.*)
Borneo, Asia. (*Dutch.*)
Bourbon, Isld., Africa. (*Fr.*)
Brazil, South America.
Bulgaria, Principality of
Burmah, British India.
Cabul, Afghan, *via* Italy.*†
Cacheo, Isld., Africa. (*Port*)
Cambodia, Fr. P. Offices in.
Cameroons (or Kameroun), West Africa.
Canary Islands. (*Spanish.*)
Canton, Hong Kong, P. O.
Cape Verde Is., Afr. (*Port.*)
Caroline Is., Oceanica. (*Sp.*)
Carthagena, U. S. Colombia.
Casablanca, Morocco. (*Sp.*)
Celebes, Asia (*Dutch.*)
Ceuta, N. Africa. (*Spanish.*)
Ceylon. (*British.*)
Chaffarine Is., N. Afr. (*Sp.*)
Chandernagore, India. (*Fr.*)
Chili, South America,
China, *via* Russia.
China, *via* Hong Kong.
China, *via* France.
Cochin China (French Col. in)
Colombia (U.S. of) S. Amer.
Comino, Malta. (*British.*)
Cominotto, Malta. (*British.*)
Congo (State of) W. Africa.
Constantinople, Turkey.¶
Corisco Is., Africa. (*Sp.*)
Costa Rica, Cent'l America.
Cuba, W. I. (*Spanish*)
Curacoa Is., W.I. (*Dutch.*)
Cyprus Island. (*British*)
Dagana, Senegal. (*French.*)
Damao, Asia. (*Portuguese.*)
Denmark.¶
Desirade Isld., W. I. (*Fr.*)
Diu, Asia. (*Portuguese.*)
Dominica Isld., W. I. (*Brit.*)
Dominica, Rep. of, W. I.
Ecuador, S. America.
Egypt, Africa.¶
Falkland Is., S. Amer. (*Br.*)
Faroe Islands, Denmark.
Fernando Po. Is., Afr., (*Sp.*)
Finland, Gr. Duchy, Russia.
Flores, Asia. (*Dutch.*)
Foo-chow, Hong Kong P. O.
Formosa, *via* Hong Kong.
France.¶
French Colonies, all.
Fusam-po, Corea, Jap. P.O.
Gaboon, Senegal. (*French.*)
Gambia, W. Africa. (*Br.*)
Gambier, Is., Oceanica. (*Fr*)
Genzanshin, (Corea.) Japanese P. O. at.
Germany.¶
Gibraltar, Spain. (*British.*)
Goa, Asia. (*Portuguese.*)
Gold Coast, W. Africa. (*Br.*)
Goree, Senegal. (*French.*)
Gozzo, Malta. (*British,*)
Grand Bassam, W. Afr. (*Fr*)
Great Britain.¶
Greece.
Greenland, N. America.
Grenada, Isld., W. I. (*Br.*)¶
Grenadines Is., W. I. (*Br.*)
Guadeloupe Is., W. I. (*Fr.*)
Guadur, British India.
Guatemala, Centr. America.
Guiana, Br., Fr. and Dutch.
Hankow, Hong Kong P. O.
Hawaii, Sandwich Islands.¶

RATES OF POSTAGE TO FOREIGN COUNTRIES—*Continued.*

Hayti, Isld., W. I.
Hatien, Cochin China. (*Fr.*)
Heligoland Isld., Germany.
Hindostan, British India.
Hoihow, Hong Kong P. O.
Holkar, Br. Ind. *via* Italy.†
Honduras, Br. C. America.
Honduras, Rep. C. America.
Hong Kong, China.¶
Hungary.
Hyderabad, Ind.,*via* Italy.*†
Iceland Isld., Denmark.
India, British.¶
India (French Est'blish'ts in)
Ionian Isles, Greece.
Ireland.¶
Isle of Pines, Oceanica. (*Fr.*)
Italy.¶
Jamaica, Isld., W. I. (*Br.*)¶
Japan, Asia.¶
Java, Batavia, Asia (*Dutch*).
Jinsen (Corea), Jap. P. O. at
Kalgan, China, *via* Russia.
Kameroun.
Karakal, India. (*Fr.*)
Kashmir, Ind., *via* Italy.*†
Kiung-Chow, H'g K'g P. O.
Labrador.
Labuan, Philippine Isl. (*Br.*)
Ladakh, Thibet *via* Italy.*
Ladrone Is., Oceanica (*Sp.*)
Lagos, W. Africa (*Br.*)
Larrache, Morocco. (*Span.*)
Les Saintes, Is., W. I. (*Fr.*)
Leeward Is., W. I. (*Br.*)
Liberia, Africa.
Lichtenstein, Princ. Austria.
Lombok, Asia. (*Dutch.*)
Low Islds., Oceanica. (*Fr.*)
Loyalty Is., Oceanica (*Fr.*)
Luxemburg (Gr. Duchy of).¶
Luzon, Philippine Is, (*Sp.*)
Macao Hong Kong P. O.
Macassar, Asia. (*Dutch.*)
Madagascar Isls., Afr. (Ste. Marie and Tamatave *only*).
Madeira, Isld., Portugal.¶
Madura, Asia. (*Dutch.*)
Mahe, India. (*French.*)
Malacca Straits Sett's. (*Br.*)
Malta, Isld. (*British.*)
Mandalay, Br. Indian P. O.
Manila, Philippine Isls. (*Sp.*)
Mariana Is., Oceanica. (*Sp.*)
Marie Galante, Is.,W. I. (*Fr.*)
Marquesas Is., Oce'ca. (*Fr.*)
Martinique Is., W. I. (*Fr.*)
Massowah, R. Sea (It.P.O. at)
Mauritius Is., Africa. (*Br.*)
Mayotte, W. Africa. (*Fr.*)
Mazagan, Morocco. (*Span.*)
Melilla. N. Africa. (*Span.*)
Mindanao, Philip'ne Is. (*Sp.*)
Miquelon, Is., N. Am. (*Fr.*)
Mogador, Morocco (*Sp.*)
Moldavia, Roumania.
Moluccas, Asia. (*Dutch.*)
Monaco, Princip. of France.
Montenegro.
Montserrat, W. I. (*British.*)
Morocco, Fr. & Sp. P. O. in
Mozambique, Africa. (*Port.*)
Muscat, British Indian P. O.
Mysore, Br. Ind., *via* Italy.†
Mytho, Cochin China. (*Fr.*)
Nassau, N. P. Bahamas. (*Br.*)
Navigators Islands (Ger. P. O. at Apia.)
Netherlands.¶
Netherland Colonies in Asia, America and Oceanica.
Nevis, Isld., W. I. (*British.*)
New Caledonia, Ocean. (*Fr.*)
Newfoundland.
New Guinea,Oce'ca. (*Dutch.*)
Nicaragua, Centr. America.
Ning-po, Hong Kong, P. O.
Norway.¶
Nossi-be, W. Africa. (*Fr.*)
Nubia, Egypt.
Obock, East Coast of Africa (French P. O. at.)
Ourga, China. *via* Russia.
Palawan, Philip'ne Is. (*Sp.*)
Panama, U. S. of Colombia.
Panay, Philip'ne Isl. (*Sp.*)
Papua, Oceanica. (*Dutch.*)
Paraguay, S. America.
Patagonia, S. America.
Pegu, British India.
Pekin, China, *via* Russia.
Penang, Straits Settlts. (*Br.*)
Penon de Gomera, N.Af. (*Sp.*)
Persia, Asia.
Persian Gulf, Br. Ind. P. O.
Peru.
Philippine Is., Ocea. (*Sp.*)
Pines, Isle of, Oceanica.
Pondicherry, India. (*Fr.*)
Porto Rico, W. I. (*Span.*)
Portugal.¶
Port. Col'o's, Asia & Africa.
Poulo-Condor, C. China. (*Fr.*)
Prince, Isld., Africa. (*Port.*)
Rabat, Morocco, Spa. P. O.
Reunion Isld., Africa. (*Fr.*)
Rhio-Riouw, Asia. (*Dutch.*)
Rodrigues Is., Africa. (*Br.*)
Roumania.
Russia.
Saba Islds., W.I. (*Dutch.*)
Saffi, Morocco, Span. P. O.
Saigon, Cochin China. (*Fr.*)
Salvador, Central America.
Samoan Islands (Ger. P. O. at Apia)
Sandwich Islds., Oceanica.
San Domingo Republic,W.I.
San Marino Republic, Italy.
Senegal, W. Africa. (*Fr.*)
Senegambia,W. Africa. (*Br.*)
Servia.
Seychelles, Is., Africa. (*Br.*)
Shanghai (U. S. Postal Agency at.)
Shanghai *via* Hong Kong.
Shanghai *via* France.
Siam, Asia.
Sierra Leone, W. Af. (*Br.*)
Singapore, Asia. (*British.*)
Soudan, Egypt.
Spain.
Spanish Colonies in Asia, Africa, America & Oce'ca.
St. Bartholomew, Is'ld, W.I. (*French.*)
St. Christopher I., W.I. (*Br.*)
St. Croix Isl., W. I. (*Dan.*)
St. Domingo, Republic,W.I.
St. Eustatius Is.,W.I. (*Dut.*)
St. John Is., W. I. (*Dan.*)
St. Kitt's Is., W. I. (*Br.*)
St. Lucia Is., W. I. (*Br.*)¶
St. Louis, W. Africa. (*Fr.*)
Ste. Marie Madagasc'r. (*Fr.*)
St. Martin, W. I. (*Fr. & Dut.*)
St. Pierre, W. I. (*French.*)
St. Thomas Is. W. I. (*Dan.*)
St. Thome Is., Afr. (*Port.*)
St. Vincent, W. I. (*Br.*)¶
Staten Island, S. America.
Straits Settlem'ts, Asia.(*Br.*)
Sumatra, Asia. (*Dutch.*)
Sumbawa, Asia. (*Dutch.*)
Surinam, S. America. (*Dut.*)
Swatow, Hong Kong P. O.
Sweden.¶
Switzerland.¶
Tahiti Isld., Oceanica. (*Fr.*)
Tamatave, Madagasc'r. (*Fr.*)
Tangier, F. & Span. P. O.
Tenasserim, British India.
Terra del Fuego.
Tetuan, Morocco, Sp. P. O.
Tien-Tsin, China, *via* Russia.
Timor, Asia. (*Dut. & Port.*)
Tobago Isld., W. I. (*Br.*)¶
Tonquin (French P. O. in.)
Touboual, Oceanica. (*Fr.*)
Trinidad Isld., W. I. (*Br.*)
Tripoli (Italian P. O. at.)
Tschandok, Co. China. (*Fr.*)
Tuamotou, Oceanica. (*Fr.*)
Tunis, (Fr. and Italian P. O.)
Turkey—Europe and Asia.
Turk's Island, W. I. (*Br.*)
Uruguay, S. America.
Venezuela, S. America.
Vingh-Long, C. China. (*Fr.*)
Virgin Isles, W. I. (*British.*)
Wallachia, Roumania.
West Indies.
Yanaon, India. (*French.*)
Zanzibar, Afr., *via* Aden.*

COUNTRIES OR PLACES NOT IN UNIVERSAL POSTAL UNION.

Prepayment is compulsory.
† The limit of payment is at port of debarkation ; for all other places, to destination.
‡ Samples are not accepted for these destinations.
§ Registration is allowed on letters and other articles. Fee, 10 cents.
‖ Registration is allowed *only* on letters. Fee, 10 cents.
¶ Money orders are issued at same rates as specified at top of page 409.
Postal cards can not be sent from the United States to any of the following places *except* Canada.

COUNTRIES OR PLACES OF DESTINATION.	PER 15 GRAMS, OR ½ OUNCE.	News-papers.		OTHER PRINT'D MATTER AND SAMPLES	
		LIMIT OF WEIGHT.	EACH PAPER.	LIMIT OF WEIGHT.	EACH PACKAGE.
	Cts.	Oz.	Cts.	Oz.	Cts.
Africa, except Egypt, Liberia, Congo, the Transvaal, British, French, Spanish and Portuguese Colonies, the Terriotries of South-West Africa, and of Togo, Western Africa (German Protectorates), Tunis, and the European post-offices in Morocco, Abyssinia, and Madagascar, by British Mail......†	15	4	4	2	5
Ascension Island, S. Atlantic, British Mail...	15	4	4	2	5
Australia, all parts, by British Mail, *via* Brindisi................‖	12	no	2	4	4
Basutoland, *see* Cape Colony.					
Bechuanaland, S. Africa, British Mail............................§	19	no	5	2	7
British Columbia, *see* Canada.					
Caffraria, *see* Cape Colony.					
Canada (*Limit of Letter Weight: 30 grams, or 1 oz. Postcards and all printed matter at domestic rates*) ....§¶	2	4	1	8	10
Cape Colony, S. Africa, British Mail...........................§¶	15	4	4	2	5
Chatham Islands, Oceanica, *via* San Francisco.................‖	12	no	2	4	4
China, British Mail, *via* Brindisi...................................§	13	4	5	2	4
Comoro Islands (except Mayotte) Mozambique Channel..........	5	no	2	2	1
Fiji Islands, *via* San Francisco and Sydney.....................†‡	5	no	2	2	2
Griqualand, *see* Cape Colony.					
Kimberly, *see* Cape Colony.					
Madagascar, except St. Mary's and Tamatave, by British Mail.†	13	4	4	2	4
Morocco, except Spanish Possessions on West Coast...........†	15	2	2	2	2
Natal, S. Africa, by British Mail.....................................§	15	4	4	2	5
Navassa, West Indies, direct mail.............................†‡	5	no	2	2	2
Navigator's Islands, Pacific ....†‡	5	no	2	2	2
New Brunswick, *see* Canada.					
New South Wales...¶	12	no	2	4	4
New Zealand...‖¶	12	no	2	4	4
Norfolk Island, Pacific, *via* San Francisco.......................‖	12	no	2	4	4
Nova Scotia, *see* Canada.					
Orange Free State, *see* Cape Colony.					
Pitcairn Island, Pacific (*No registration.*)......................†‡	5	no	2	2	2
Prince Edward Island, *see* Canada.					
Queensland...¶	12	no	2	4	4
St. Helena, South Atlantic, British Mail..........................§	15	4	4	2	5
Samoan Islands, *see* Navigator's Islands.					
Shanghai, direct, *via* San Francisco.............................‡‖	5	no	2	2	2
Tasmania or Van Diemen's Land.. ....¶					
Transvaal, South Africa, British Mail............................§	19	no	5	2	7
Vancouver's Islands, *see* Canada.					
Victoria...¶	12	no	2	4	4
West Australia, British mail, *via* Brindisi, exclusively...........	12	no	2	4	4

Reduced Price List, January, 1891.

CARBUTT'S DRY PLATES AND "CELLULOID" FILMS.

TRADE MARK

SIZE OF PLATES.	"Eclipse," "Special," "A," "B," and Orthochromatic Plates.	Stripping Plates.—"Special," Sen. 23 to 25, kept in stock. Other brands to order.	Ground Glass Transparency Plates.—"A" Emulsion.	Plain Opal Plates.—Coated with "A" Emulsion.	Ground Opal Plates.—Coated with "A" Emulsion.
	Doz.	Doz.	Doz.	Doz.	Doz.
2½ x 2½	$ 30	. . .	. . .	. . .	. . .
2⅝ x 2⅝		. . .	. . .	. . .	. . .
2½ x 4	35	. . .	. . .	. . .	. . .
3¼ x 4¼	45	. . .	. . .	$0 55	$0 60
4 x 5	65	$0 90	$0 70	80	85
4¼ x 5½	75	1 00	95	1 00	1 15
4¼ x 6½	90	1 20	1 15	1 20	1 45
4¾ x 6½	1 00	1 25	. . .	. . .	. . .
5 x 7	1 10	1 45	1 40	1 50	1 80
5 x 7½	1 25	1 65	. . .	. . .	. . .
5 x 8	1 25	1 65	1 60	1 70	2 25
			½ Doz.	½ Doz.	½ Doz.
6½ x 8½	1 65	2 20	1 15	1 20	1 45
8 x 10	2 40	3 20	1 65	1 75	2 15
10 x 12*	3 80	5 05	2 50	2 65	3 25
11 x 14	5 00	6 65	3 20	3 50	4 20
14 x 17	9 00	12 00	5 50	6 00	7 00
16 x 20	12 50	16 65	. . .	. . .	. .
17 x 20	13 00	17 30	. . .	. . .	. . .
18 x 22	15 50	20 00	. . .	. . .	. . .
20 x 24	18 50	24 50	. . .	. . .	. . .

Size of "Celluloid" Films for Negatives, coated with "B," Special, Eclipse, or Ortho. Emulsion; for Positives with "A" Emulsion.	"Celluloid" Films. Negative and Positive.
	Doz.
3¼ x 4¼	$0 55
4 x 5	80
4¼ x 5½	90
4¼ x 6½	1 10
4¾ x 6½	1 20
5 x 7	1 40
5 x 7½	1 50
5 x 8	1 55
6½ x 8½	2 10
8 x 10	3 00
10 x 12	4 75
11 x 14	6 25

"Celluloid" Films For the Moessard Panoramic Camera.

8 x 28 Cm. . .	$1 30	24 x 84 Cm. . .	12 15
12 x 42 " . .	3 20	28 x 98 " . .	17 60
16 x 50 " . .	4 90	32 x 112 " . .	23 00
20 x 70 " . .	8 50		

French Measure.

PLATES AND FILMS.

Centimeter.	Plates	Films
9 x 12	$ 60	$ 80
12 x 16	95	1 15
12 x 16½	1 00	1 20
13 x 18	1 10	1 40
12 x 20	1 25	1 50
18 x 24	2 20	2 85
21 x 27	2 85	3 10
24 x 30	2 80	4 30
27 x 33	4 50	4 95

* 10 x 12 and larger are in ½-dozen boxes.

CARBUTT'S LANTERN PLATES 55CTS. PER DOZ.

On Specially Imported THIN CRYSTAL GLASS, Size 3¼ x 4.

Manufactured by JOHN CARBUTT,

(Pioneer Manufacturer of *Gelatino-Bromide* and *Orthochromatic plates* in America.)

KEYSTONE DRY PLATE AND FILM WORKS.

WAYNE JUNCTION, PHILADELPHIA.

Of the three processes operated by us it can be said that each in its particular field is capable of the very highest results. In connection with our printing departments, a combination of the very highest order is offered to those who require artistic and meritorious work.

For the production of printing plates we offer the following methods — "Moss Type" (so called half tone) by which relief engravings are made directly from photographs — "Moss' New Process of Photo-Engraving" for the reproduction of line or stipple drawings or prints — "Zinc Etchings" for open line work, maps and script, corresponding to this specimen.

THE FIRST PAGE IS PHOTO-ENGRAVED

Moss Engraving Co., N. Y.

OMEGA SENSITIZED PAPER

TRADE MARK Ω

— AND —

Bradfisch ∴ Aristotype ∴ Paper.

With the introduction of Gelatino-Emulsion Paper a new era has been started in Photographic Printing, especially by the Amateur, who appreciates so many marked advantages in this paper over Sensitized Albumen Paper. It prints quicker, softer and richer than these, and renders all the fine details of the negative; it will keep the high-lights and half-tints without requiring the shadows to be overprinted. Negatives of ordinary strength, as used for Albumen printing, will give surprising results, but fine prints are also obtained from thin or dense negatives. This paper will not ***curl, crack*** or ***frill*** under any circumstances; it will also not stretch and cause distortion. Nothing can exceed the beauty of the prints, which are toned and fixed without previous washing in our combined bath (formula for same given in directions). Any desirable tone, ranging from the richest sepia brown to the velvety black, with remarkably pure whites, can be obtained in this bath, requiring less care and labor than any other method. If protected from the actions of light, air and dampness, the paper will keep its good quality for four months or longer.

Especially adapted for Portraits, on account of the high finish it receives from burnishing. Can also be glacé with fine results.

PRICE LIST OF OMEGA AND ARISTOTYPE PAPERS.

Size.	Per doz.	By Mail.
3¼ x 4½	$0 20	$0 22
4 x 5	25	27
3⅞ x 5½ (Cabinets trimmed)	30	33
4¼ x 6½ (" untrimmed)	35	38
5 x 7	40	43
5 x 8	45	50
6½ x 8½	70	77
8 x 10	90	1 00
20 x 24	4 00	
20 x 24	40 per sheet.	

Full and explicit directions on each package.

Omega Toning Solution, for toning and fixing Aristotype, Omega, or Albumen Prints. Gives any tone and clear prints. Bottles, 50c.

BRADFISCH & HOPKINS,

Manufacturers of Sensitized Photographic Papers,

22 & 24 Division Street, Brooklyn, N. Y.

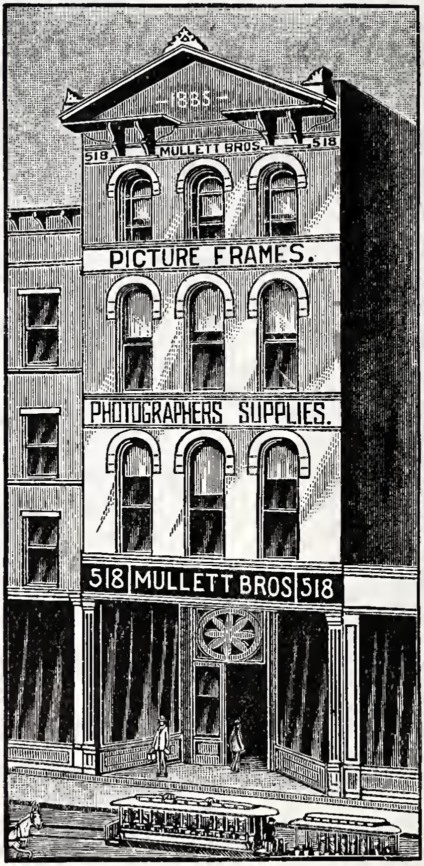
WE scarcely need any advertisement,

But announce ready for delivery

OUR CATALOGUE AND PRICE LIST,

No. 11.

CONCEDED TO BE THE FINEST CATALOGUE EVER ISSUED.



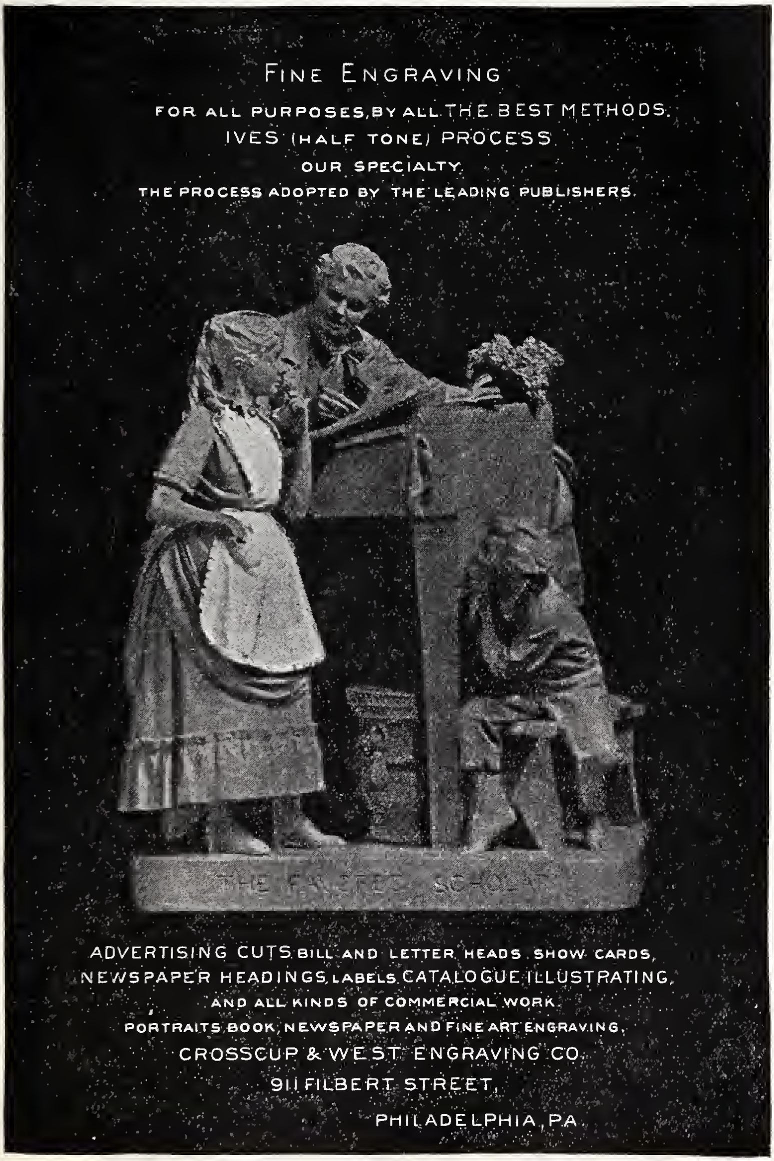
WE HAVE THE STOCK TO BACK IT UP,

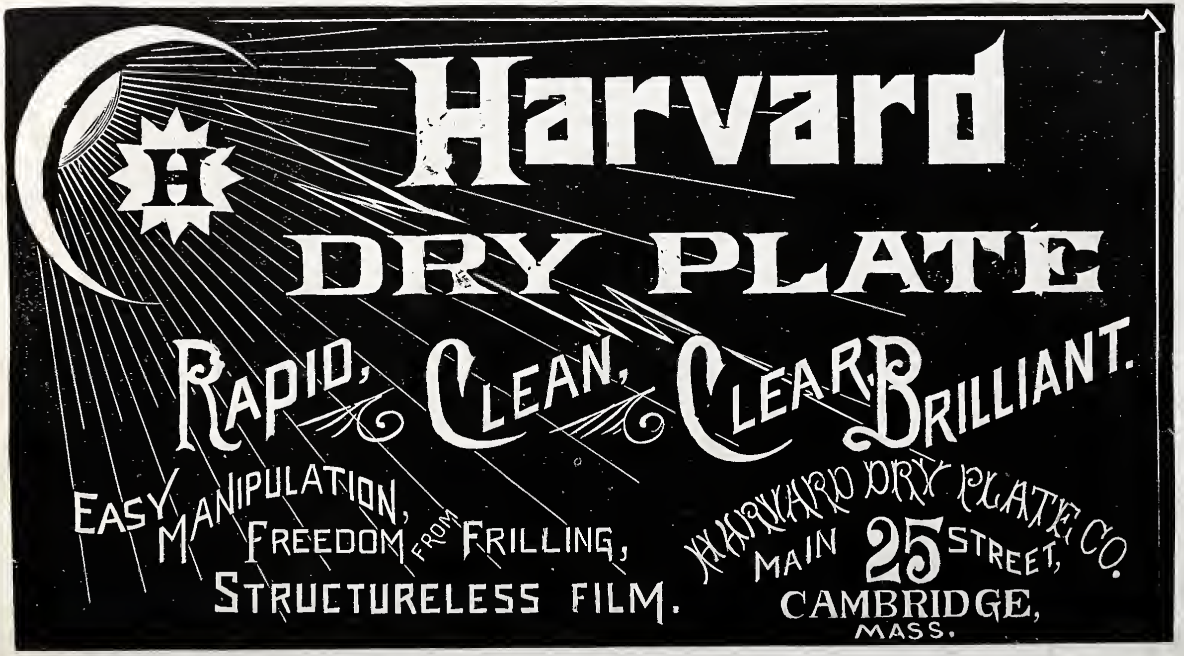
All Orders entrusted to us will have careful and prompt attention.

With thanks for past favors,

MULLETT BROS.,

518 Walnut St., KANSAS CITY, MO.


FINE ENGRAVING
FOR ALL PURPOSES, BY ALL THE BEST METHODS.
IVES (HALF TONE) PROCESS
OUR SPECIALTY.
THE PROCESS ADOPTED BY THE LEADING PUBLISHERS.
ADVERTISING CUTS BILL AND LETTER HEADS SHOW CARDS,
NEWSPAPER HEADINGS LABELS CATALOGUE ILLUSTRATING,
AND ALL KINDS OF COMMERCIAL WORK.
PORTRAITS BOOK, NEWSPAPER AND FINE ART ENGRAVING.
CROSSCUP & WEST ENGRAVING CO.
911 FILBERT STREET,
PHILADELPHIA, PA.



A full supply kept in stock by **THE SCOVILL & ADAMS CO.**

PRICES

UPSIDE DOWN.

9 9 9 9 9 9 9 9

Turn these figures upside down, and in place of 9's you have 6's, See?

6 6 6 6 6 6 6 6

We are turning prices upside down, and the difference between OUR upset prices and other prices is

THE DIFFERENCE

BETWEEN 6 AND 9.

The difference between six and nine is three and this shows the important fact that

Our PRICES are ONE-THIRD LESS

Than those of any other Photographic Stock House in the United States. These are facts, solid and stubborn. They are not to be got away with by any cheap device of bluff or bravado. We place our goods on the market, quantity and quality, against those of competing firms, and say:

MEET OUR PRICES!

That's a sort of meeting that nobody's heard of so far, and nobody will hear of it. We have facilities for buying that make us, practically

MASTERS OF THE MARKET.

But all this is talk. What is there in it? Be the judge yourself. Come and see how much you can save by buying of us, or, to convince yourself that what we state as facts, *are facts*, send for our lists, and make comparison with others.

We Invite all visiting the city to call upon us, when we will take pleasure in showing all the latest novelties in the business.

Send for our Celebrated Bargain Lists and Lists of Specialties.

R. H. MORAN,

396 BROOME STREET,

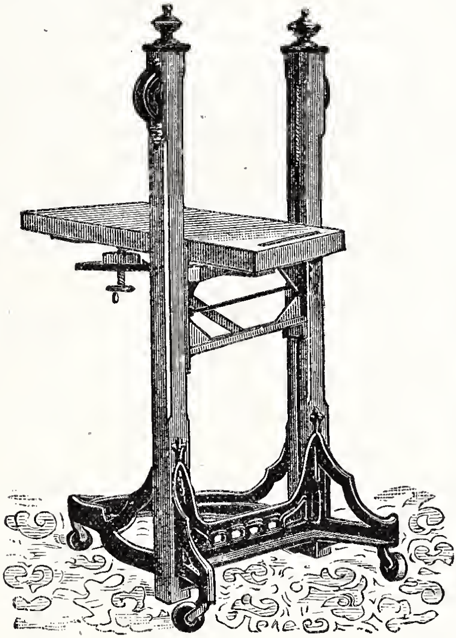
NEW YORK.

C. H. CODMAN & CO.,

Photographic Stock Dealers.

SOLE AGENTS FOR

SILVER MEDAL.



AWARDED FIRST PRIZE.

The Semi-Centennial Camera Stand.

C. H. C. & Co.'s Albumen Paper.

The Venus Improved Lantern.

Odin Fritz Retouching Medium.

New England Agents for American Optical Company's Goods.

Send for Price List.

34 Bromfield St., BOSTON, MASS.

KODAKS.

The enormous demand for Kodaks has severely taxed our facilities for turning them out during the past summer. We do not believe in making poor goods, and hence have not allowed the pressure for more goods to lower our standard in the slightest degree. Every Camera is subjected to the most rigorous practical test before leaving our works, hence it must be right before sending out.

We have greatly enlarged our Camera works during the past few months, and expect to be able to ship all orders for 1891 promptly.

THE EASTMAN CO.,

Rochester, N. Y.

EASTMAN'S

Permanent Bromide Paper.

We received the highest award at the PARIS EXPOSITION in competition with all Continental makers.

The IMPERIAL TECHNICAL SOCIETY of Russia, at its recent Exhibition at Odessa, awarded this Paper its highest and only Medal for marked superiority over all other exhibits.

The Eastman Company,

ROCHESTER, N. Y.

THE EASTMAN PHOTOGRAPHIC MATERIALS COMPANY, LIMITED, LONDON.

TRANSPARENT FILMS.

Probably never before in the history of Photography has any new article met with such immediate recognition as our rollable Transparent Films.

The avalanche of orders poured in upon us during the past summer nearly overwhelmed us, but we did our best to satisfy everybody in the face of extraordinary difficulties, with inexperienced hands and new machinery.

Realizing at an early day the insufficiency of our facilities, we laid our plans for a very large increase, to meet the demand for 1891.

We have now in process of erection, on our newly purchased lands near Rochester, three buildings, having over two acres of floor space to be devoted to the manufacture of **rollable Transparent Films.**

This immense plant will be in operation by February or March, and, equipped with improved machinery and every convenience suggested by our previous experience, the product will be greatly superior to anything we have yet been able to turn out.

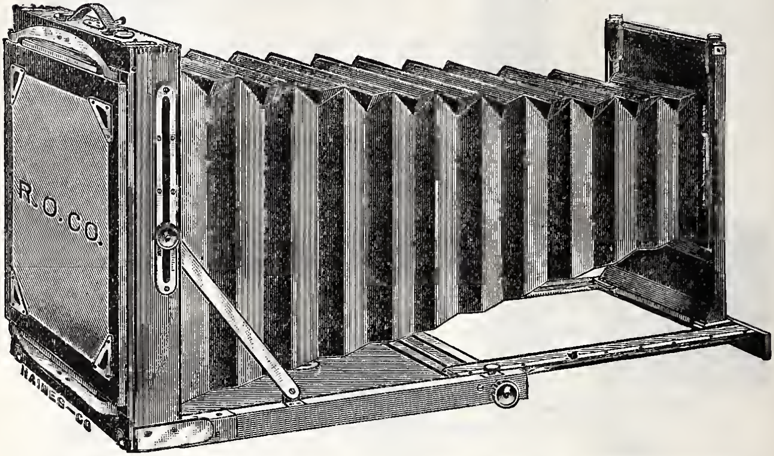
Our customers may rely upon a full supply of Film in 1891.

The Eastman Company,

ROCHESTER, N. Y.

THE

"Universal" Camera.

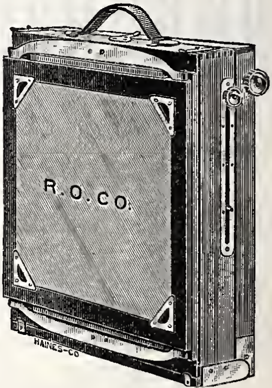


CAMERA FULLY EXTENDED.

PRICE LIST.

With Combination Tripod, Pefection Holder and Canvas Carrying Case.

	Single Swing.	Double Swing.
3¼ x 4¼	$27 00	$29 00
4 x 5	28 00	30 00
4¼ x 6½	30 00	32 00
5 x 7	33 00	35 00
5 x 8	36 00	38 00
6½ x 8½	40 00	43 00
8 x 10	45 00	48 00
10 x 12	52 00	56 00
11 x 14	60 00	65 00



FOLDED.

The Universal Camera is the most compact camera in market, the 6½ x 8½ being but 2¾ inches thick when folded and weighs but 5 pounds, and has a draw of 20 inches.

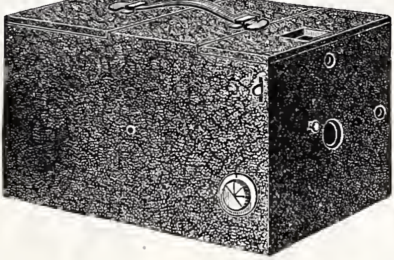
The Universal is conceded to be the best View Camera in market, every detail being as near perfect as possible.

SEND FOR CATALOGUE.

ROCHESTER OPTICAL CO.,

Or to any Dealer in Photo. Supplies. *ROCHESTER, N. Y.*

PREMIER.



The shutter is a novel device and is so constructed that it revolves in one direction only, not requiring to be set and only requires to be wound up to be always ready ; it will make six exposures without rewinding. The repeating shutter is of especial advantage in using a Roll Holder and Films, as no safety device is required to cover the Lens while setting the shutter.

The lens is our well known R. O. Co. Single View Lens, with revolving diaphragms, and the camera is so made that any other lens may be substituted if desired.

With this camera either glass plates or films can be used, or both, as the Plate-Holders and Roll Holder are interchangeable.

The camera is made capable of carrying six Perfection Holders, holding one dozen plates.

PRICE.

4 x 5 Complete with one holder, . . .	$18 00
Extra Perfection Holders, ...	1 00
Roll Holder, loaded for 48 exposures, . .	13 00

For Excelsior Lens instead of Single View Lens add $6.00.

We make all kinds of View Cameras.

Send for our Catalogue.

Rochester Optical Co.,

ROCHESTER, N. Y.

SUN & SHADE.

Prize ∴ Competition.

WITH the first number of Vol. III, of "SUN AND SHADE," will be commenced the publication of a series of selected pictures by amateurs. In the first instance these will be reduced in size and published in groups, of such a number as may do justice to each. One page of each number of the magazine will be set apart for this purpose. At the expiration of a year cash prizes of $100 will be paid for the best picture in each class, as follows:

For the best Figure Composition, $35.

For the best Landscape, including Sea Pieces, $25.

For the best Instantaneous Picture, $25.

For the best Picture not included in the above, $15.

The judges will be selected by the subscribers to "SUN AND SHADE," and the selected pictures will then be published as full page illustrations.

The object of this competition is to promote the study of the artistic side of Photography.

All amateurs are invited to contribute, but it is only intended to publish in any case such pictures as have distinct merit and would be esteemed to be satisfactory to our subscribers.

A photograph only need be sent.

SUN & SHADE.

"Sun and Shade," for a magazine that has not a line of text, is much more "readable" than many a more wordy periodical. It needs to be seen to be appreciated; and this all will do who have the faintest artistic spark.—*Boston Times.*

"Sun and Shade" is a beautiful collection of art work in tint, Photo-gravure, and similar processes. It is remarkable for its artistic effect of accidental light.—*Newark Daily Advertiser.*

This splendid and unrivaled magazine * * * * has no peer in the world of art or letters.—*Springfield Sunday News*

The illustrations are all of marked beauty.—*Boston Journal.*

"Sun and Shade" is unique and handsome.—*Canadian Advance.*

"Sun and Shade" deserves all the compliments it is receiving.—*Inter-Ocean, Chicago.*

"Sun and Shade" is one of the most tasteful and attractive of the numerous Art magazines.—*N. Y. Observer.*

"Sun and Shade" is just what lovers of art need.—*Once a Week*

"Sun and Shade" is a splendid publication.—*The Standard.*

"Sun and Shade" is not only pleasing, but educational in its broadest sense.—*Zion's Herald.*

"Sun and Shade," the really artistic monthly.—*Worcester Spy.*

Negative by Alex. Henderson, Montreal, Can. Kurtz Process.

IN THE SELKIRK MOUNTAINS, NEAR GLACIER STATION, C. P. R. R.

Negative by Alex. Henderson, Montreal, Can. Kurtz Process.

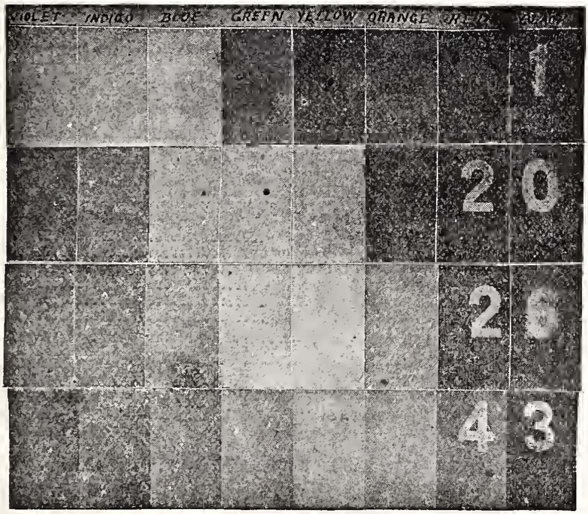
THE GREAT SELKIRK GLACIER FACE.

IMPORTANT REDUCTION !

Carbutt's Orthochromatic Plates

Are now sold at same price as his **B** Landscape, Special Portrait, and Eclipse Instantaneous, and are strongly recommended for general Gallery and View work, Photograpbing Paintings, Flowers, etc. We present below extracts from the paper by Henry G. Piffard, M. D., read before tbe New York Camera Club, 1888.

"Let the Color Cbart be placed before the Camera and evenly illuminated by good diffused daylight, using an ordinary Gelatino-bromide Plate—tbe result is shown in No. 1. Now take a plate from same box and bathe in erythrosine solution, using a color screen—the result is as sbown by No. 20. Another exposure was made on a CARBUTT ORTHOCHROMATIC Plate, using a Turmeric screen—the light values are represented by No. 26. From an artist's translation of Mr. Bierstadt's color chart, in black, white, and half tone, a negative was made on a plain plate, and is shown in No. 43. This, it will be noticed, is very similar to that obtained on the Carbutt Ortho Plate, as shown in No. 26. To Mr. Carbutt, then, the credit should be given of having proddced the best plate for the reproduction of the ligbt values of the principal pigments."



From Negative on an ordinary Gelatine Dry Plate.

From Negative, ordinary Gelatine Dry Plate, bathed in Erythrosine Solution, and Color Screen.

From Negative on a regular Carbutt Ortho Plate and Color Screen.

From Negative of black, white and half tone, artist's copy of color chart, on plain Gelatine plate.

Carbutt's Ortho Plates have been extensively used by professional and amateur photographers—by the latter on extensive journeys abroad, and with the most flattering and satisfactory results. We can only give one of hundreds of testimonials in our possession :

Kansas City, October 8, 1890.

John Carbutt, Esq., Wayne Junction, Philadelphia.

Dear Sir:—I have used your Orthochromatic Films, 5 x 7, during the past Summer, having made 200 pictures in the Selkirk Mountains of British Columbia, and 100 in California and Colorado. I was most satisfied with the films I developed ; the negatives are clear and brilliant in the most satisfactory way, and I only regret that I ever took a picture on my travels in the United States on any other plate and film than yours. I am rather decided to use them further on in the European Alps.

Please advise me at enclosed address where I can obtain your Orthochromatic Films in Europe.

Very truly yours, EMIL HUBER (Swiss Alpine Club).

Circulars, "How to use Ortho Plates," sent on receipt of address.

FOR SALE BY ALL DEALERS.

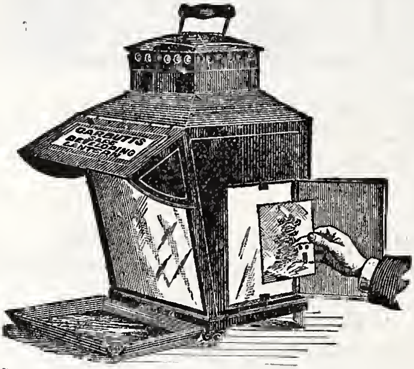
Manufactured by JOHN CARBUTT,

(*Pioneer Manufacturer of Gelatino-Bromide, and Orthochromatic Plates in America*),

Keystone Dry Plate Works, **WAYNE JUNCTION,** ***PHILADELPHIA.***

CARBUTT'S

Multum in Parvo Dry Plate Lantern.



Lantern arranged for developing, and after fixing examining negatives by opal light.

Has three separate and distinct forms of light, each side and front. The left side door when open emits a clear white light for making Transparencies by contact. The front a safe 8 x 10 Ruby light for developing by. The right door when open a soft Opal light for examining Negatives or Transparencies.

It is fitted with coal oil lamp, silvered reflector, and movable hood on front to shade the eyes.

Price, $6.00.

Boxed ready for shipment.

FOR SALE BY ALL DEALERS.

ENDORSED AS THE MOST EFFICIENT AND PRACTICAL DARK-ROOM LANTERN MADE.

PHOTOGRAPHIC SPECIALTIES.

CARBUTT'S HYDROCHINON DEVELOPER.

Will neither stain the fingers nor the plates, and, no matter how much the development is prolonged, the shadows will remain clear.

It gives negatives of quick-printing quality and fine wet-plate appearance. For Transparencies, Lantern Slides, and Line-work Negatives it has no equal, as has been thoroughly demonstrated on Carbutt's Lantern and "B" Sen. 12 Plates.

Full and complete instructions for use accompany each bottle.

PRICE FOR TWO 8-oz. BOTTLES, 60 CENTS.

CARBUTT'S Keystone Dry Plate Varnish, 8 oz. bottle	$ 50
CARBUTT'S Translucent Ruby Paper, 25x20 .... 25c.; by mail,	30
CARBUTT'S Concent'd Pyro and Soda-Potash Developer, two 8 oz. bottles in case,	60
Lantern-Slide Matts, round corner or circle, with gilt line around opening, per 100	1 00
Adhesive Binding Strips for Slides, per 100	20
Thin Crystal Cover Glass, 3¼ x 4, per dozen	40

FOR SALE BY

THE SCOVILL & ADAMS CO., NEW YORK,

AND DEALERS IN PHOTO MATERIALS GENERALLY.

Descriptive Circulars mailed on application to

JOHN CARBUTT, KEYSTONE DRY PLATE WORKS,

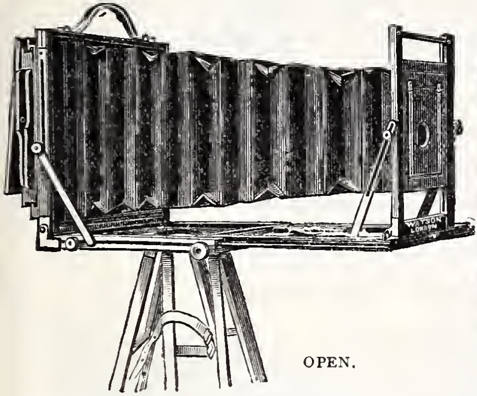
Wayne Junction, Philadelphia.


DESIGNING AND ENGRAVING
157 & 159
WILLIAM STREET
NEW YORK

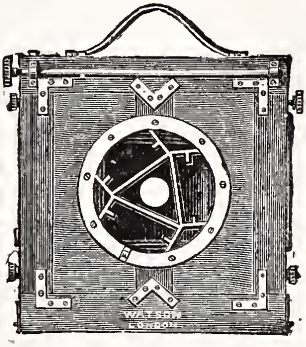
(See following page.)

WATSON'S "ACME" CAMERA.

Commented on by the leading English Photo. Papers as "Of remarkable portability;" "Wonderful lightness;" "The greatest advance in Camera construction yet reached;" "May be fairly said to take the lead;" "Messrs. W. have found by ingenious modifications how to make the weight lighter and the rigid still more firm."



OPEN.



CLOSED.

——PRICE LIST.——

English Sizes	6½ x 4¾	7½ x 5	8½ x 6½	10 x 8	12 x 10	15 x 12
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Acme Camera and three double dark slides......	9 12 0	10 0 0	12 5 0	14 0 0	16 12 6	21 0 0
Rapid Rectilinear Lens with Iris Diaphragm....	4 0 0	4 10 0	5 0 0	6 10 0	8 5 0	10 10 0
Solid Leather Traveling Case with Spring Lock..	1 15 0	1 15 0	2 2 0	2 10 0	3 0 0	3 15 0
Rotating Turntable in base and Tripod Stand..	2 2 0	2 2 0	2 2 0	2 10 0	2 15 0	3 3 0
Instantaneous Shutter....	18 0	18 0	1 1 0	1 4 0	1 4 0	1 10 0
Extra if Camera and Slides are Brass Bound........	1 10 0	1 10 0	1 15 0	2 0 0	2 10 0	3 0 0
	19 17 0	20 15 0	24 5 0	28 14 0	34 6 0	42 18 0

WATSON'S DETECTIVE CAMERA, 1890 PATTERN,

With Magazine to hold 12 Plates or Films.

Size. 4¼ x 3¼ inches, - - - - - - - - - £10 10s

Watson's Popular Tourist's Cameras, Studio Cameras and Studio Stands, Backgrounds, Printing Frames, Tripods, Dry Plates, Chemicals, Dishes, etc.

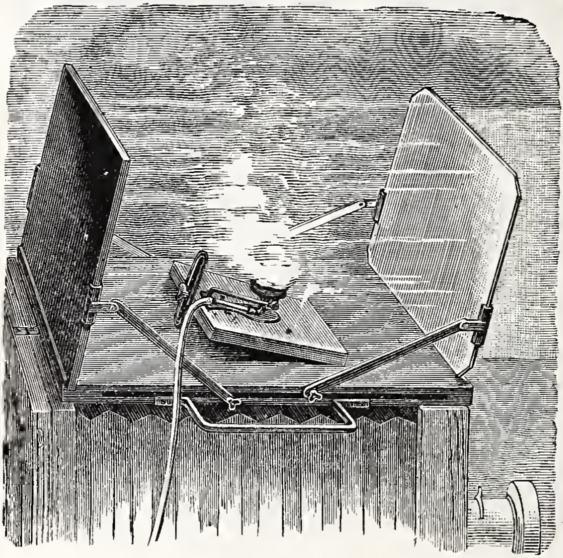
Prices are subject to 10 per cent. discount for cash with orders—any item not required may be eliminated from the set and the price deducted.

Watson's PREMIER CAMERAS are same Prices as above.

W. WATSON & SONS, 313 HIGH HOLBORN, LONDON, ENGLAND, AND 251 SWANSTON ST., MELBOURNE, AUSTRALIA.

(See preceding page.)

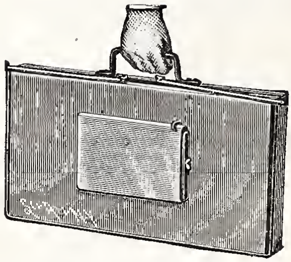
Bridges' Flash-Light Diffuser.



SUCCESS ASSURED

A REAL PLEASURE

Patented November 4, 1890.



DIFFUSER FOLDED.

The use of this device is an assurance against the annoyance of shadows, and produces a wonderful degree of sharpness and perfection of detail, making as fine negatives as those made by daylight.

The tendency to "blinking" is removed by the use of this appliance, which thoroughly diffuses and equalizes the light, and does not flash it in a luminous glare on the object to be photographed.

Price, without Lamp, - - - - - - **$5.00**
" with " - - - - - - **7.50**

Full instructions accompany each apparatus.

Specimen pictures made by this process sent to any address on receipt of 25 cents in stamps.

It is simple in design, easily worked, and gives perfect results. Never disappoints.

JOHN S. BRIDGES, Patentee,
No. 15 South Charles St., BALTIMORE, MD.

JOHN W. MORRISON,

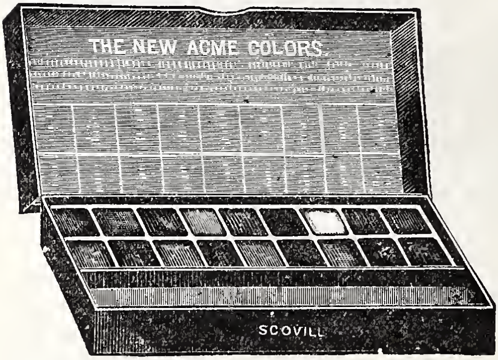
PHOTOGRAPHIC · MATERIALS,

AMATEURS' SUPPLIES.

→ Etchings, Engravings, Cases, Frames, Mouldings, Etc. ←

10 Sixth Street, PITTSBURGH, PA.

Acme Transparent Water Colors.



For Coloring and Painting

PHOTO · PORTRAITS

on all kinds of Paper,

And all Fabric Painting.

These Colors are unequaled.

They are more powerful than colors in liquid form, less waste and can be used on any material without crawling.

Large box, Palette and instructions.............................$2 50
Amateur box, " " " 1 00

All colors and Acme Medium in separate pans.
For sale by all principal dealers in Artists' Materials, or of the

ACME WATER COLOR COMPANY,

243 State Street, *CHICAGO, ILL.*

BUCK'S DRY DEVELOPER

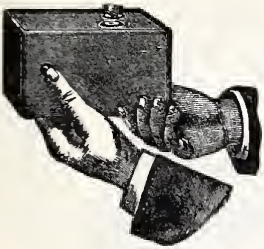
HYDROCHINON * CAPSULES.

Light, Compact—Just the thing for Tourists.

PRICE, 60 CENTS PER SET.

(PATENT PENDING.)

AN entirely new and practical idea by which a chemically pure DRY DEVELOPER, working admirably on any make of DRY PLATES, can be preserved *unchanged* for any length of time; transported *by mail* to any part of the country (occupying but a very small space), and used to make any quantity of Developer, without the use of measures or weights of any kind. *Directions for use inside each box.*



Kodak Cameras.

INSTRUCTION FREE.

"YOU PRESS THE BUTTON, WE DO THE REST."

For sale by

J. S. CUMMINS.

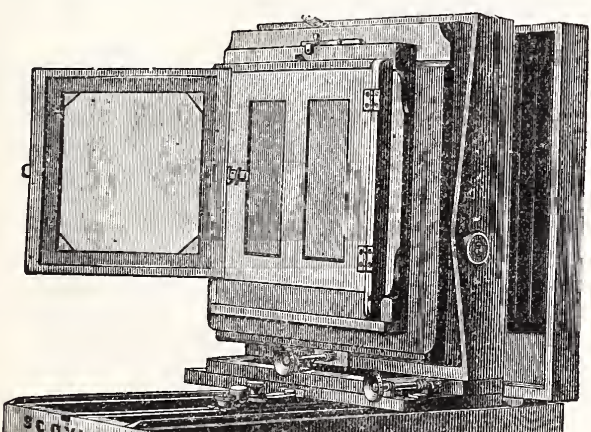
CUMMINS' Studio

Photographic Supplies

106 N. CHARLES ST.

SEND FOR CATALOGUES.

The American Optical Co.



Boston Imperial Cameras.

The 11 x 14 Boston Imperial Camera is the same as an 11 x 14 Portrait Camera, with the addition of an 8 x 10 Carriage and an 8 x 10 Holder, and is used to make two imperials on an 8 x 10 or 4-4 plate, using one 4-4 lens · two cards on a 5 x 8 plate, using one 1-2 size lens; two large panel pictures, 6 x 10 inches in size, can also be made, and regular work from 11 x 14 to 1-4 inclusive. All with Double Swing-back and Waterbury Holder.

No. 30.—11x14 Boston Imperial Camera, with	8x10	attachment and holder,	$ 85 00
" 31.—14x17 " " " "	8x10	" "	100 00
" 32.—17x20 " " " "	8x10	" "	110 00
" 33.—18x22 " " " "	8x10	" "	120 00
" 34.—20x24 " " " "	11x14	" "	140 00

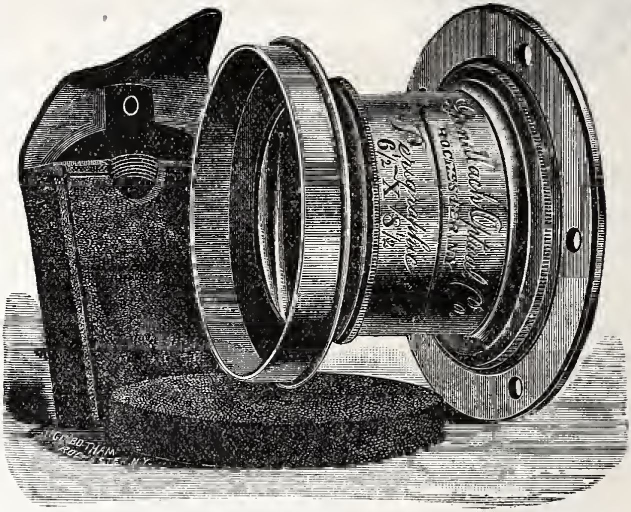
FOR SALE BY ALL DEALERS.

GUNDLACH ✣ OPTICAL ✣ Co.,

ROCHESTER, N. Y.

MANUFACTURERS OF

Photographic Lenses.

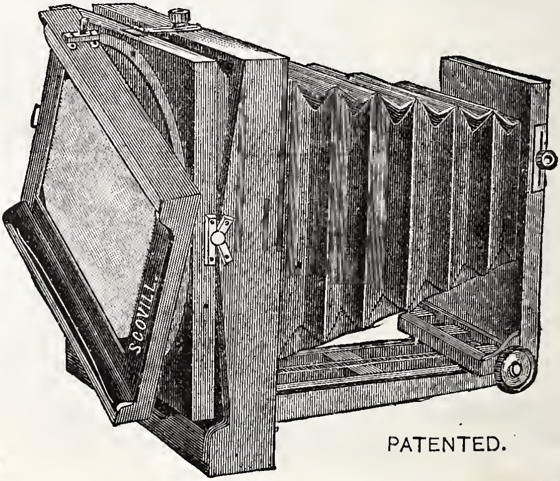


Send for Price List.

For Sale by Scovill & Adams Co.

SCOVILL REVOLVING BACK CAMERAS

FRONT FOCUS PATTERN.



PATENTED.

FOR SALE BY ALL DEALERS.

SEE REDUCED PRICE-LIST IN NEW AMERICAN OPTICAL CO. CATALOGUE.

No.	REVERSIBLE For View	Sing. Sw.	Doubl. Sw.	With Reversible Back and Holder Extra
120	4 x 5 in.	$27.00	$32.00	......
121	4¼ x 5½	29.00	34.00	......
122	4¼ x 6½	31.00	36.00	......
123	5 x 7	33.00	38.00	......
124	5 x 8	35.00	40.00	......
125	6½ x 8½	40.00	45.00	......
126	8 x 10	45.00	50.00	......

No.	With Detachable Back. REVERSIBLE For View	Sing. Sw.	Doub. Sw.	With Reversible Back and Holder Extra
127	10x12	$60.00	65.00	
128	11x14	65.00	70.00	$ 90.00
129	14x17	75.00	80.00	105.00
130	17x20	85.00	90.00	115.00
131	18x22	95.00	100.00	130.00
132	20x24	115.00	120.00	150.00

CATALOGUE ON APPLICATION.

SCHULTZE PHOTO EQUIPMENT CO.
HEADQUARTERS FOR PHOTOGRAPHERS SUPPLIES.
5 CHATHAM SQ.
NEW YORK

MENTION "TIMES ANNUAL."

The Scovill Handy Flasher

Has been tried with safe "flash" mixtures like the Scovill Magnesium Compound, and invariably has given successful results. There is no device intended to accomplish the same purpose which is so convenient and portable. In fact it folds so compactly that it has been styled the "pocket flasher." A still more important consideration in its favor is that it may be so held as to throw the light downward, and thus avoid shadows. This is very important when flash photographs are made where there are light hangings and wall in the background. Some expert photographers attach a piece of cardboard to the handles of this flasher to serve as a reflector The Asbestos plates furnished and the use of fuse serve as additional safeguards to the operators.

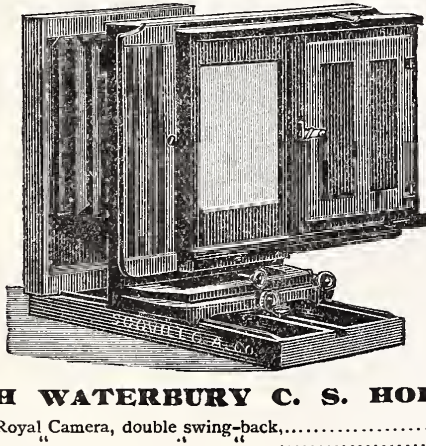
Price, Handy Flasher, - - $0.75.

The CRAMER PLATES.

G. CRAMER DRY PLATE WORKS,

St. Louis, Mo., U. S. A.

American Optical Co. Royal Cameras

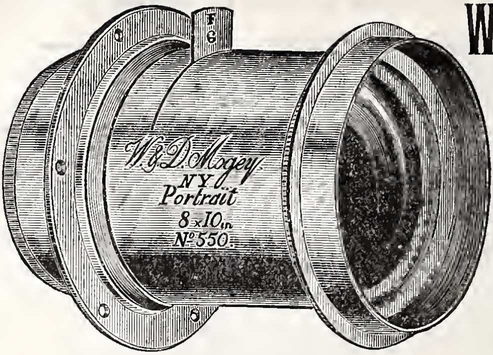


WITH WATERBURY C. S. HOLDER.

No. 40.— 8 x 10	Royal Camera, double swing-back,	$50 00
" 41.—11 x 14	" " "	85 00
" 42.—14 x 17	" " "	110 00

Above the 8 x 10 size an extra ground-glass is supplied for use in focusing when pictures of groups are being taken.

FOR SALE BY ALL DEALERS.



W. & D. MOGEY,

Manufacturers of

HIGH GRADE Portrait and Landscape

LENSES.

With Working Intensity from *F-4*.

The highest quality of Lenses obtainable for Portraits, Groups, Landscapes, Architectural work and Copying, being absolutely free from distortion.

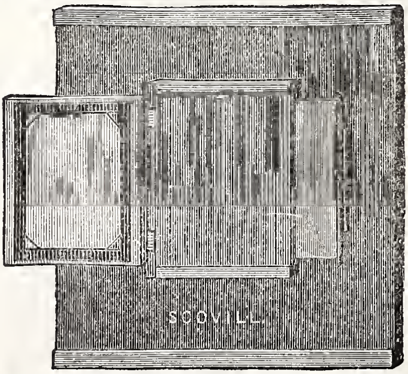
Lenses sent on approval to responsible parties.

Send for Catalogue of Lenses.

418 West 27th Street, New York.

THE AMERICAN OPTICAL CO.

CABINET PLATE HOLDER ATTACHMENT



Consists of a board the same size of the plate-holder of the camera. It is put in place the same as holders. upon pegs, with spring catch at top In center of board is an opening with hinged ground-glass to receive the holder selected, 4¼x6¼, 5x7, or 5x8. Can be fitted to any 8x10 or larger portrait camera by sending exact size of plate-holder. When wishing to use larger plates can be instantly removed. By the aid of this attachment and twelve single light-weight holders you always have a supply of plate-holders loaded and ready for use, save the expense of large extra holders and many a trip to the dark-room, and you are sure of always getting your subject in the proper position on the plate.

For	8x10	Am. Optical Co. Eclipse Portrait Camera with one single Light-Weight Holder, price,	$ 8 00
"	10x12	" " " " " " " "	9 00
"	11x14	" " " " " " " "	10 00
"	12x15	" " " " " " " "	11 00
"	14x17	" " " " " " " "	11 00
"	15x18	" " " " " " " "	12 00
"	17x20	" " " " " " " "	13 00
"	18x22	" " " " " " " "	13 00
"	20x24	" " " " " " " "	14 00

GAYTON A. DOUGLASS & CO.

MERCHANTS IN

Photographic ♦ Supplies.

IMPORTERS OF THE

Laverne Combination Lens,

With Time and Instantaneous Shutter and Iris Diaphragm.

Laverne Optical Lanterns.

185 & 187 Wabash Ave.,

CHICAGO, ILL.

AMERICAN

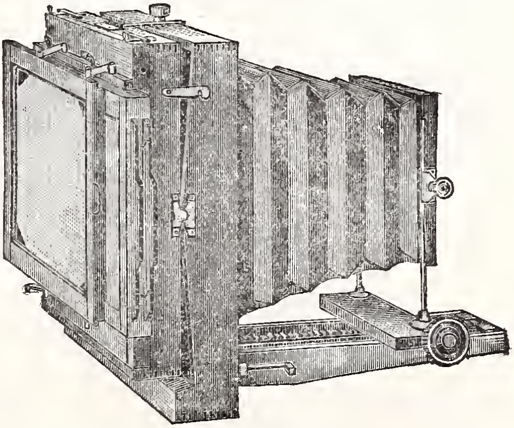
OPTICAL CO'S

Star View CAMERAS.

(PATENTED.)

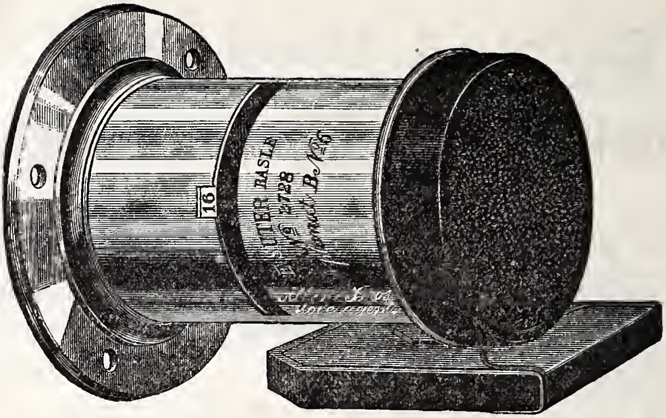
The Star Reversible Back Cameras have the patent reversible back, with automatic latch, which allows Holder to be inserted without holding back the ground-glass frame, the rack and pinion movement, and the *patent latch* for making the bed rigid instantaneously.

Each Camera is supplied with one Daisy Holder with *patent Registering Slides* and canvas case.



STAR REVERSIBLE-BACK CAMERAS.

	Single Swing-back.	Double Swing-back.
No. 110— 4 x 5	$25 00	$29 00
" 111— 4¼ x 5½	26 00	30 00
" 112— 4¼ x 6½	30 00	34 00
" 113— 5 x 7	32 00	35 00
" 114— 5 x 8	34 00	38 00
" 115— 6½ x 8½	36 00	40 00
" 116— 8 x 10	40 00	44 00
" 117—11 x 14	60 00	64 00



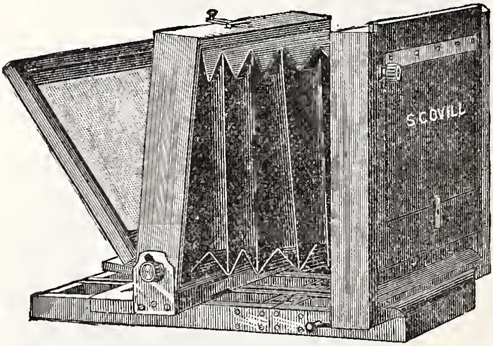
SUTER ✱ LENSES.

THE BEST IN THE WORLD.

Send for Price Lists and Testimonials.

ALLEN BROS., DETROIT, MICH.

WATERBURY OUTFITS.



THE WATERBURY CAMERAS are made of mahogany, are well polished, have rubber bellows, folding platform, *patent latch* for making bed rigid instantaneously, single swing, vertical shifting front, and are as light and compact as substantial cameras can be constructed.

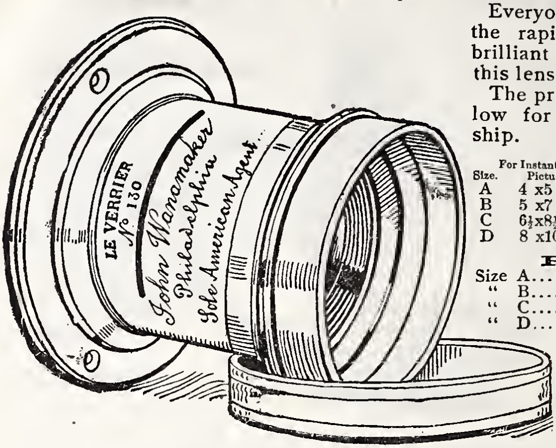
4x5 Waterbury Outfits, Complete **$12 00**

Consisting of single swing Camera, with new style holder, with registering slides (double dry). wood carrying case, Taylor tripod, and No. A Waterbury lens with revolving diaphragm.

4¼x5½	**Waterbury**	**Outfits,**	**Complete**	**14 00**
4¼x6½	"	"	"	**15 00**
5 x7	"	"	"	**16 00**
5 x8	"	"	"	**16 50**
6½x8½	"	"	"	**21 00**

FOR SALE BY ALL DEALERS.

The New "Leverrier" Rapid Rectilinear Lens.



Everyone is pleased with the rapidity and clear, brilliant pictures made by this lens.

The price is placed very low for such workmanship.

Size.	For Instantaneous Pictures:	With small Diaphragm.	Focus.
A	4 x5 in.	5x 7 in.	$5\frac{1}{3}$ in.
B	5 x7 "	8x10 "	$8\frac{1}{8}$ "
C	$6\frac{1}{2}$x$8\frac{1}{2}$ "	10x12 "	$11\frac{1}{8}$ "
D	8 x10 "	11x14 "	$13\frac{1}{2}$ "

PRICE.

Size A	$17.00
" B	28.00
" C	37.00
" D	48.00

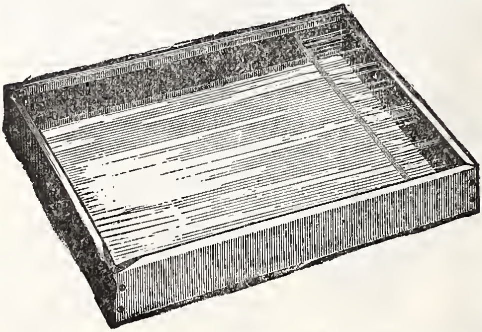
After a week's trial if not satisfactory, money will be refunded.

We've everything the Amateur Photographer wants. Send a postal if you cannot come, we'll send by next train or delivery.

JOHN WANAMAKER, Optical Department, Philadelphia.

The Acme Glass Bottom Developing Trays

FOR DRY PLATES.



These Trays enable the operator to develop a plate without removing it from the solution until fully developed.

The Acme Trays are made of Walnut, with Glass Bottoms, and Receptacle at one end to hold the solution while looking at the plate. They also have buttons adhering to the glass to prevent suction.

The Acme Trays are superior to all others in respect to cheapness, durability and cleanliness. They are lined with acid proof cement, and warranted not to leak.

PRICES FOR TRAYS WITH RESERVOIR TO DEVELOP.

5 x 7	Plate and smaller	$1 00	
5 x 8	"	1 20	
$6\frac{1}{2}$ x $8\frac{1}{2}$	"	1 25	
8 x 10	Plate	$1 30	
10 x 12	"	2 00	
11 x 14	"	2 25	
15 x 18	"	4 00	

20 x 24 Trays for silvering whole sheets, without reservoir, but with double thick glass bottom........ 5 00

The Buffalo Photo-Holder.

A NEW and convenient substitute for the antiquated album—a novelty that will be appreciated for its many merits. Made in all styles of cover, Leather, Plush and Paper. Recently Patented. Special rates to dealers.

SHERWOOD & BARNARD,

No. 20 WEST EAGLE ST., KREMLIN HALL, BUFFALO, N. Y.

FOR SCENIC EFFECTS

USE THE OLD RELIABLE

BUFFALO ✦ ARTIFICIAL ✦ VINES.

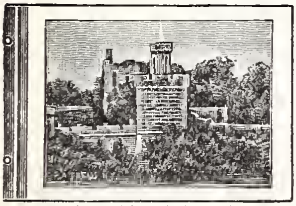
Shaded Ivy Vines greatly enhance Scenic Effects.

MANUFACTURED EXCLUSIVELY BY

S. G. SHERWOOD.

Special rates to Dealers only. **352 ASHLAND AVE., BUFFALO, N. Y.**

HOWARD · ALBUMS.



This cut illustrates a single card with picture mounted, ready for binding into the album.

A collection of 25 or 50 cards are bound together in an album by a strong binding cord suitably attached to the handsome covers.

This method of making an album affords the amateur the best means of preserving the results of his labor, because each picture may be finished before putting the card in the album. The arrangement of the pictures may also be altered at will—if a single card is spoiled the whole album is not ruined. If a picture is taken out, it can be quickly and readily done without injury to the volume.

PRICE OF HOWARD ALBUMS.

Full Cloth, Embossed, Gold Label, with A. M. Collins Manufacturing Co.'s No. 1 Cards.

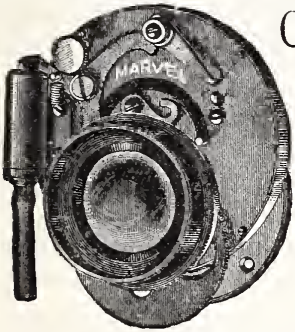
				With 25 Collins Cards.
No. 1 — 6x 7	Cards,	for 4 x 5	Photographs	$1 25
" 2 — 7x10	"	" 5 x 8	"	1 50
" 2½ — 8x10	"	" 6½x 8½	"	2 00
" 3 — 10x12	"	" 6½x 8½	"	2 25
" 4 — 11x14	"	" 8 x10	"	2 50

Morocco, Half Leather, Extra Gold Finish, with A. M. Collins Manufacturing Co.'s Cards. Boxed.

				With 25 Collins Cards.	With 50 Collins Cards.
No. 5— 7x10	Cards,	for 5 x 8	Photographs	$2 25	No. 11—$3 50
" 6— 8x10	"	" 6½x 8½	"	2 75	" 12— 4 00
" 7—10x12	"	" 6½x 8½	"	3 50	" 13 – 4 75
" 8—11x14	"	" 8 x10	"	4 00	" 14— 5 50
" 9—14x17	"	" 10x12 or 11x14		5 50	" 15— 9 00
" 10—16x20	"	" 11x14 or 14x17		7 75	" 16—11 00

GRAY'S

PERISCOPE LENSES



Can now be obtained with Time and Instantaneous Shutter, which is a MARVEL of compactness and perfection.

R. D. GRAY,

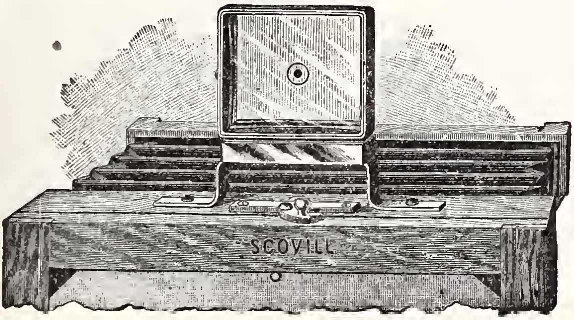
OPTICIAN,

76 BEEKMAN ST., NEW YORK.

SCOVILL MAGIC FINDERS,

(PATENTED.)

Unequaled for Landscape Photography.



One sees through them a marvelously clear *non-reversed* image *the exact proportion* of the reversed one on the ground-glass. The Magic Finders are light, ornamental, easily adjusted and detached, and pronounced a great convenience by view takers.

PRICE LIST.

No. 1, for 4x5 Camera	$1 50	No. 3, for 6½x 8½ Camera	$2 25
" 2. " 5x8 "	1 75	" 4, " 8 x 10 "	2 75

FOR SALE BY ALL DEALERS.

\$25. A PRIZE \$25.

—OF—

Twenty-five Dollars in Gold

WILL BE PAID FOR THE

Photograph of a Dog.

Sent to us before the 1st of March, 1891, that we consider the best for the purpose of reproducing and placing in our new Catalogue, to be issued in April, 1891.

CONDITIONS.—We are to be the sole Judges in awarding the Prize and no photo will be returned. Mark your name and address distinctly on the back of each photo. Photographs being equal in quality of work, preference will be given to the best specimen of a Type of Dog, rather than to a mixed or mongrel breed.

MEDFORD FANCY GOODS COMPANY,

DOG OUTFITTERS,

I. BREMER, Pres't & Treas. 44 & 46 Duane St., NEW YORK.

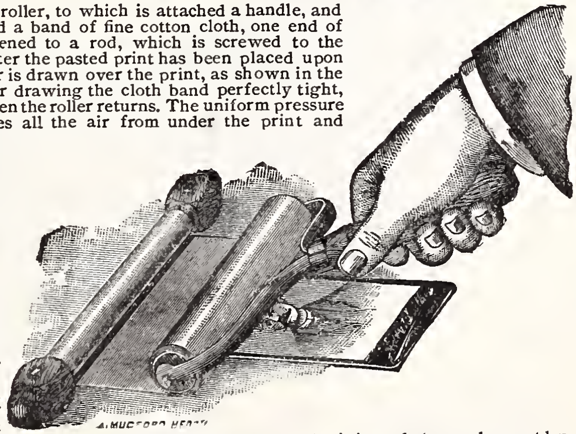
The only exclusive Manufacturers in the world of

DOG COLLARS AND FURNISHINGS.

Send 50 cents for our 150 page, No. 11, Illustrated Catalogue, in nine colors, which will be rebated on the first order amounting to not less than \$1.00.

THE ADT PATENT PRINT MOUNTER

Consists of a spring roller, to which is attached a handle, and upon which is wound a band of fine cotton cloth, one end of the band being fastened to a rod, which is screwed to the mounting table. After the pasted print has been placed upon the mount, the roller is drawn over the print, as shown in the cut, the spring roller drawing the cloth band perfectly tight, and re-winding it when the roller returns. The uniform pressure of the roller removes all the air from under the print and presses it securely to the mount. It absorbs the moisture from the surface of the print leaving it perfectly smooth. The band is of sufficient length so that when, in time, a portion of it becomes soiled, it can be wound upon the removable rod, which is fastened to the table thereby exposing a clean surface. When the entire band becomes soiled, it may be removed, washed and replaced. It will be noticed that in drawing out the roller it is made to revolve, not by friction on the print, but by the tension of the cloth, one end of which is held by the rod, and screwed to the mounting table. Therefore, any amount of pressure can be used without moving the print in any direction. Beware of imitations in which the rollers are made to revolve by friction on the print. Where two rollers are employed twice the amount of friction is produced by the double rollers, causing the print to be misplaced. The Adt Mounter is the simplest, strongest, cheapest, and only practical mounter made. It will mount all sizes of prints. No complications or getting out of order. **Price, \$1.60 each.**



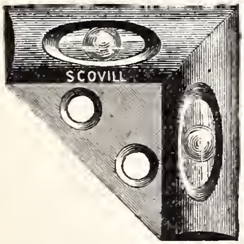
THE SCOVILL & ADAMS COMPANY, Trade Agents.

PHOTOGRAPHERS VISITING THE PACIFIC COAST ARE INVITED TO AVAIL THEMSELVES OF CONVENIENTLY ARRANGED DEVELOPING AND CHANGING **ROOMS**, AND HAVE THEIR MAIL SENT IN MY CARE.

THE MOST COMPLETE AND CAREFULLY SELECTED STOCK ON THE PACIFIC COAST.

LANTERN SLIDES OF **ALASKA**, YOSEMITE, BIG TREES, YELLOWSTONE.

The * Scovill * Double * Level.



THE Scovill Double Level will be appreciated by Landscape and Tourist Photographers. It is quite compact and may be attached either to the body or platform of the Camera, and may be used also with cameras of different sizes.

PRICE, 40 CENTS.

HALF-TONE ZINC ETCHING.

I am selling printed half-tints, sizes 24 x 24 inches, and 9 x 11 inches, specially constructed for all the Half-Tone Photo-Engraving and Zinc-Etching Processes.

I also give instruction by letter and practical.

1. For preparing the necessary Negatives for the Half-Tone Processes.

2. In my excellent process of Copying directly on Zinc Plates.

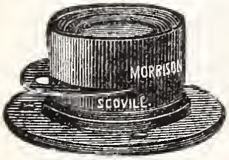
3. In my peculiar process of Zinc-Etching in Line and Half-Tone.

Detailed prospectus and samples on application, by

A. D. TUERCKE,
9 ELBINGER STR.,
BERLIN, N. O.

THE MORRISON

WIDE-ANGLE VIEW LENSES.



These Lenses are absolutely rectilinear; they are the most rapid, and are universally conceded to be the BEST WIDE-ANGLE LENSES MADE.

No.	Diameter of Lens.	Size of Plate.	Equivalent Focus.	Price.	
0	1 inch	3¼ x 2¼ inch		$20 00	
3	1 "	4¼ x 4¼ "		25 00	
4	1 "	5 x 8 "	5¼ inch, each,	25 00	These 3 sizes will fit into 1 flange.
5	1 "	6½ x 8 "	6½ " "	25 00	
6	1 "	8 x 10 "	8 " "	30 00	
7	1¼ "	11 x 14 "	10½ " "	40 00	These 2 sizes will fit into 1 flange.
8	1¼ "	14 x 17 "	14 " "	50 00	
9	1½ "	17 x 20 "	17 " "	60 00	These 3 sizes will fit into 1 flange.
10	1½ "	20 x 24 "	22 " "	80 00	
11	1½ "	25 x 30 "	28 " "	100 00	

☞ Nos. 1 to 6 are all made in matched pairs for stereoscopic work. The shorter focused Lenses are especially adapted for street and other views in confined situations. For general purposes, a pair of No. 5 Lenses will be found most useful.

THE SCOVILL & ADAMS CO., AGENTS.

Negative by W. S. Waterbury, Greenwich, Conn.

Jay Densmore, Engraver, Niles, Mich.

HAINES FALLS.

From Carbutt Orthochromatic Plate,
by L. E. Levy.

Autoglyptic Half Tone Process.
The Levytype Co., Phila.

VIEW OF KAATERSKILL LAKE FROM HOTEL KAATERSKILL.

THE

LEUKOSCOPE LENSES

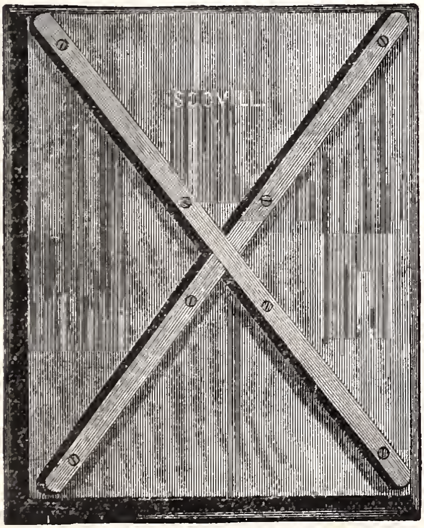
PRICES REDUCED.

The name given to these Lenses is singularly appropriate ; Leukoscope indicating a *brilliant light.* These Lenses work with greater rapidity than any of the so-called rapid Lenses, and possess a depth of focus truly remarkable. By their agency life-size heads may be taken with sharpness and delicacy. The construction is such as to insure equal illumination all over the plate, which cannot be effected by any Lens set in a long tube and worked with full aperture. When used with a medium diaphragm they will take an instantaneous group out of doors, every figure being sharp. For copying they are unexcelled.

No.	Diameter.	Size of Group.	Size of Landscape.	Back Focus.	Equiv. Focus.	Former Price.	Reduced Price.
2	4 inches	17x20	20x24	25 inches	26 inches	$170 00	$136 00
3	3½ "	16x18	17x20	21 "	22 "	150 00	120 00
4	3 "	11x13	14x17	18 "	19 "	100 00	80 00

THE SCOVILL & ADAMS COMPANY,

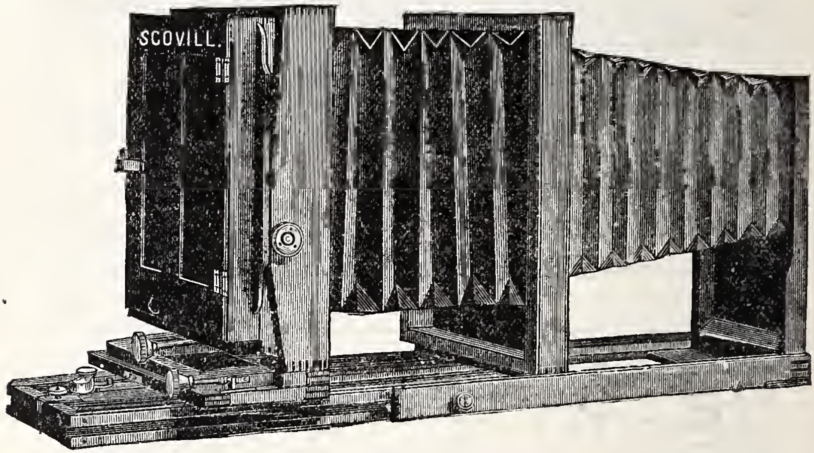
423 Broome Street, New York.


SCOVILL

American Optical Company

UNRIVALED

PORTRAIT CAMERAS.



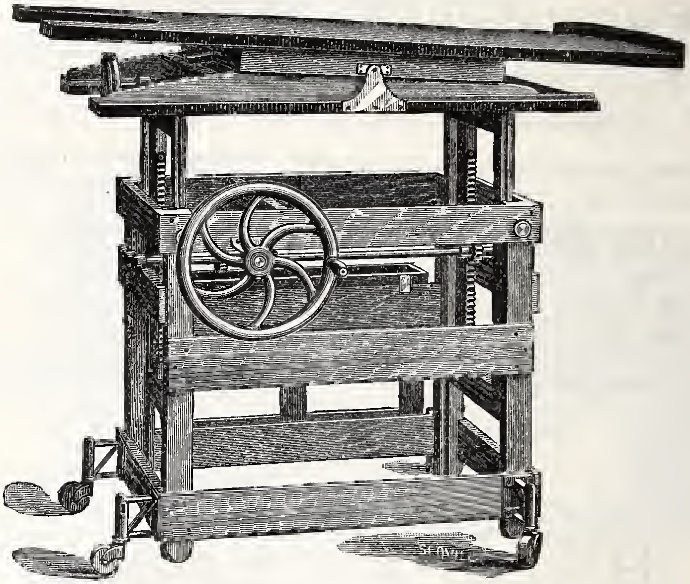
The American Optical Company Portrait Cameras are manufactured from the best mahogany, French polished, and above 10 x 12 size have double bellows, vertical shifting front, the V-shaped wooden guide, telescopic platform, and Lever Focusing Attachment, by which the most delicate focus can be adjusted with the utmost facility and ease.

No. Size.							With Double Swing-back.
5— 8x10	ins.,		with platform	30	in. long	....	$ 8 00
6—10x12	"	"	"	36	"	... .	48 00
7—11x14	"	extension	"	48	"	double bellows and vertical shifting front,	64 00
8—12x15	"	"	"	48	"	"	72 00
9—14x17	"	"	"	60	"	"	76 00
10—16x20	"	"	"	65	"	"	88 00
11—17x20	"	"	"	65	"	"	90 00
12—18x22	"	"	"	70	"	"	100 00
13—20x24	"	"	"	72	"	"	110 00
14—22x27	"	"	"	72	"	"	130 00
15—25x30	"	"	"	80	"	"	170 00

THE

"ELITE" STUDIO STAND.

(PRIZE WINNER.)



Patented.

These are the only Stands suited in workmanship and finish, also in size, to the large American Optical Co.'s Cameras, with their great length of bellows and extension platform. Practical portraitists cannot fail to admire the ease with which these stands can be adjusted at any desirable height or inclination, and the noiseless manner in which they may be moved from place to place, their elegant appearance and accurate construction.

Instead of the clumsy levers and racks, by which accurate adjustment of the platform was obtained in the older stands; the proper elevation and inclination are produced in the "Elite" stand by cog-wheel and snake screw, and the manipulation at one side by a wheel with handle, and within reach of the operator, so that he may adjust the height or inclination of this camera without taking his head from under the focusing cloth. By means of the wheel worked at the rear end of the platform, the horizontal position of the platform may be inclined upward or downward to a limit of 15 degrees. A great advantage from this movement, we observe, is that a true horizontal position—so difficult to obtain in the old camera stands—is, with these, an easy matter to effect. This is especially important to those who may use them for reproduction work. In the No. 2 size the platform is fifty-two inches long and twenty-five inches wide, and its length may be increased to seventy inches by an attachment which slides out forward, making it quite long enough for supporting a large copying camera. Then a semi-circular cut-out, to the rear end of the platform, is a convenience to the operator, who is thus enabled not only to stand closely up to the ground glass, no matter how far the camera may have been pushed forward, but bending of the body is obviated, which is quite a necessity with all the older stands.

"ELITE" STUDIO STANDS

	No. 1 Size.	No. 2 Size
PRICE, with Rack and extension for Plate Holder	$32.00	$36.00
Highest point from platform to floor	48	48
Lowest " " " "	32	32
Width of platform	22	26
Length of platform without attachment	45	52
" " with "	60	70

For Sale by all Dealers, and by Manufacturers,

THE SCOVILL & ADAMS CO.

ESTABLISHED 1875. VIEWS OF WASHINGTON AND MT. VERNON.

E. J. PULLMAN,

Photographic Supplies,

935 Penna. Avenue, WASHINGTON, D. C.

Developing, Printing and Copying for Amateurs and the Trade.

Cameras, Lenses, Outfits, and Photographic Merchandise of all kinds.

THE ROBERT DEMPSTER CO.,

HEADQUARTERS FOR

Photographers' Supplies,

411 Court Avenue, Des Moines, Iowa.

COMPLETE OUTFITS A SPECIALTY.
PROMPTNESS A LEADING FEATURE.
BEST GOODS AT LOWEST PRICES.

THE ADT
Patent Manipulator.

ADAPTABLE FOR VARIOUS SIZE TRAYS.

As will be seen by a glance at the cut, this device not only protects the hands in lifting the plate from the developer, but as they do not come in contact with the tray, stained fingers are entirely avoided.

It is attachable to and will firmly hold various sizes and depths of trays without adjusting.

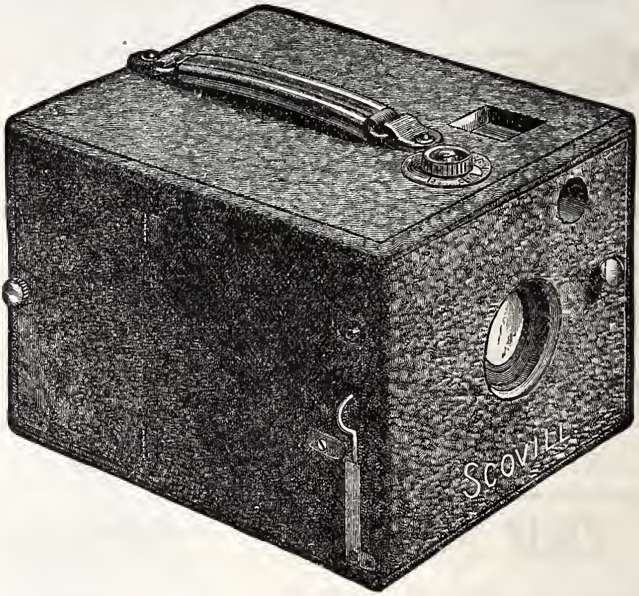
The lifter is of German Silver, flattened at the end, thus requiring no extra amount of developer.

Price, 85 Cents Each.

THE SCOVILL & ADAMS COMPANY, Agents.

—THE—

Improved Waterbury Detective Cameras.



POINTS OF SUPERIORITY.

Timed and Instantaneous Photographs. This is the only Detective Camera which is as well adapted for making views as for photographing quickly moving objects. The negatives produced are of such sharpness that they may be enlarged to almost any size. It is in fact,

The Only Detective Camera made with plate for tripod, and ground-glass the full size of the plate, just as in an ordinary view camera. This ground-glass is where it cannot easily be broken.

The Recessed Finder is fitted to the WATERBURY CAMERA, and it differs from finders ordinarily supplied in that it shows *exactly the same image* as is included on the ground-glass, though diminished in size. Without this accurate finder, one cannot be sure of what is taken in or left out of an instantaneous photograph. It is

The Least Trouble of any hand camera, because you can have the negatives developed and the finished pictures delivered directly after making the exposures by sending them to a photographic printer. Where there is no waiting and uncertainty there will be no worry.

The Instantaneous Lens in this Camera is not of the "universal focus," distorting, nondescript character, but works with such rapidity and is of such uniform excellence that it has added greatly to the popularity of this Camera.

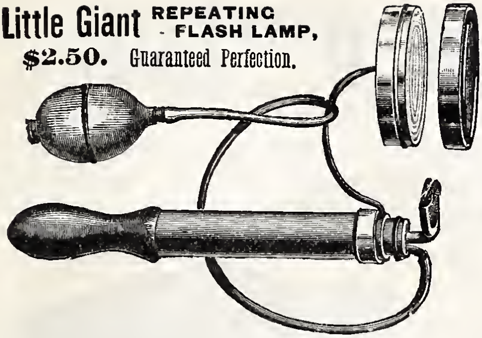
In addition to the foregoing special advantages, the small WATERBURY DETECTIVE CAMERA is lighter and more compact than any other hand camera.

The Focusing Scale is where it may be readily seen.

PRICE LIST.

	Leather Covered.
4 x 5 Waterbury Detective Camera, with 2 Double Holders	$25 00
5 x 7 Waterbury Detective Camera with 2 Double Holders	40 00

Little Giant REPEATING FLASH LAMP, **$2.50.** Guaranteed Perfection.



We also manufacture the Standard ($4.50) and the Triple Standard ($7.50). These Lamps give either continuous or intermitting light of great brilliancy. Our various Lamps, which are the only perfect ones on the market, are for sale by all dealers in Photo Supplies.

Physician's Supply Mfg. Co.,
10 Nassau St., N. Y.

Sens. Albumen Paper, 25c. per sheet. Blue Paper, 12½c. per sheet.

Ask your dealer for **JOHN LOEBER'S** Durable

SENSITIZED ALBUMEN PAPER,

AND **BLUE PROCESS PAPER,**

Or send 25c. for sample to

Photo. Printing and Mfg. Co.,

JOHN LOEBER, Manager. **59 Beekman St., New York City.**

THE ECONOMY OUTFITS.

The Economy View Cameras are made of well-seasoned mahogany, polished, and are fitted with the Howe Patent Reversible Back. They have single-swing and rack and pinion focusing adjustments, vertical shifting front, extra front board, double holder with registering slides, rubber cone bellows ; brass trimmings and canvas carrying case.

The Economy Lenses fill the want experienced by thousands for a good, low-priced rectilinear wide-angle lens, with which they can get artistic effects in perspective at short distances.

6½x8½ ECONOMY OUTFIT, Complete, Price, $40.00

COMPRISING :

One 6½x8½ Economy View Camera, described above.
One 6½x8½ Rectilinear Lens, described above.
One Taylor Folding Tripod.

Above at list prices, $50.25. When sold complete, $40.00.

8x10 ECONOMY OUTFIT, Complete, $44.00

(At list prices, $56.25).

THE KNACK DETECTIVE CAMERA.

TO MEET the demand for a cheap Detective Camera within the reach of the youth, and of those who want to make but a moderate investment in photographic appliances, we have introduced the

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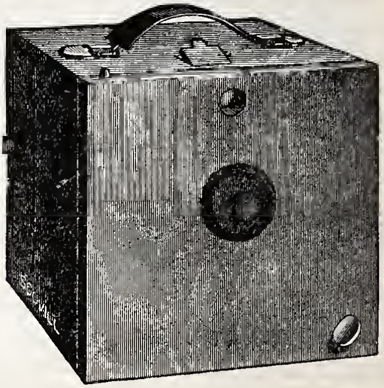


DETECTIVE CAMERA,

which is made in two styles, *i. e.*, finished in the natural wood or covered with leather. The whole front of this Camera is hinged, which is a great convenience. The Camera has a Recessed Finder, an Instantaneous and Time Shutter with Speed Regulator, Cap for timed exposures, and one Double Dry Plate Holder, and

Is certainly Lighter and more Compact than any other Cheap Detective Camera in the market, and what is still more important, has a much more Expensive and more Perfect Lens.

This Double Combination Instantaneous Lens, with Interchangeable Stops, when bought separately costs as much as the whole camera. We are enabled to make a low price on the complete camera because the cameras and Lenses are produced in such large quantities.

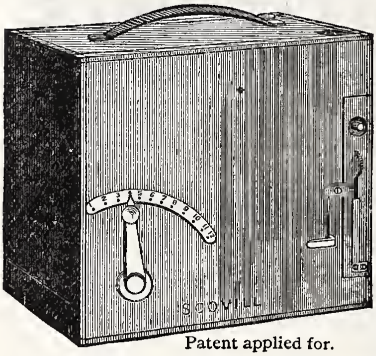
We would invite the attention of all parties interested in detective work to the sample pictures made by this camera which are on exhibition in every Photo. Stock house in this country.

	Natural Wood.	Leather Covered.
Price—4 x 5 Knack Camera, - -	$15.00	$17.50

THE SCOVILL & ADAMS COMPANY.

THE ADVILL CAMERA.

There are many amateur photographers who do not want to be encumbered with glass plates, nor do they want to use films in rolls, as in many roll holders one hundred exposures must be made before any portion of the roll can be developed, and the finished pictures conveniently made. Our new



Patent applied for.

"Advill" Camera

—made for either twelve or eighteen cut films—is a happy medium between these extremes. The cut films used with it may be of different degrees of sensitiveness, and any of them exposed at pleasure. The Lever, which is also the Indicator, may be moved backward or forward. Each film carrier has a number corresponding to a similar number on the outside of the camera. After exposing one film move the indicator along from one number to the next number to get the exposed film out of the way and the unexposed film into place.

It is not necessary to send out an elaborate handbook of instructions with this simple, effective and novel camera. Anyone can see at a glance how to **Set the Shutter, Touch the Release and Turn the Indicator.**

The camera is fitted with an Instantané Lens, which has an arrangement connected with it for changing the stops in the Lens without opening the camera. The shutter is arranged for both timed and instantaneous exposures. Attached to the leather-covered case there is a recessed finder.

At present we have only a few of these cameras, but expect soon to have a supply, ample to meet the demand.

No. 1, "ADVILL" CAMERA, for 12 4 x 5 Films, Price,	$35 00
No. 2, "ADVILL" CAMERA, for 18 4 x 5 Films, Price,	40 00
No. 3, "ADVILL" CAMERA, for 12 4 x 5 Plates, Price,	35 00

The Scovill & Adams Co.

THE ∵ TOM ∵ THUMB ∵ CAMERA.

The Cheapest, Smallest, and most Compact Detective Camera in the Market.

Can be used in or out of the Carrying Case.

Makes either a Round or Square Picture at will.

Fitted with a Rapid Double Lens (Periscope); it is a Quick Worker, and makes equally Good Work with Time or Instantaneous Exposures, for Landscapes, Small Portraits, or Lantern Slides.

Size of whole apparatus, in black walnut case, 4½ inches square.

Price complete, $10.00.

Dry Plates...per doz., 30c.
Extra Plate Holders (Double)... 90c.

Developing Outfit, $2.00.

Comprising 1 Ruby Lantern, 2 Developing Trays, 1 package Developer, with instructions, 1 2-oz. Graduate, 1 lb. Hyposulphite of Soda, 1 dozen Plates.

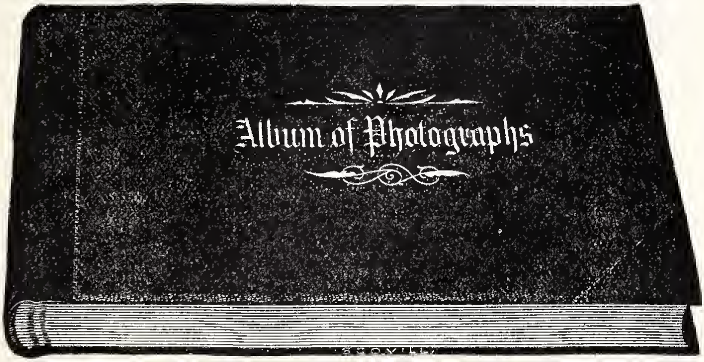
Send 4c. stamp for sample Photo.

THE OBRIG CAMERA CO.,
A. C. WILMERDING, PROP'R,
MANUFACTURERS.

163 BROADWAY,
Bet. Cortlandt and Liberty Sts., **NEW YORK.**

SPECIALTIES.

Obrig's Toning Solution (will make any tone)..............................per set, 90c.
Obrig's Hydroquinone Developer (highly recommended by all who use it), 8-oz. bottle, 30c.; 16-oz., 60c.
Obrig's Pyro and Potash Developer...per set, 60c.



PRICE LIST OF

Scovill's ∵ Albums ∵ for ∵ Photographs.

Size of Card	6x7	7x10	10x12	11x14	14x17
For Photo. (size)	4x5	5x8	6½x8½	8x10	11x14
Plain	$1.25	$1.50	$2.25	$2.50	$5.00
With Prepared Surface	1.50	1.80	3.00	3.50	6.50
With Gilt Lines	1.75	2.00	2.75	3.00	

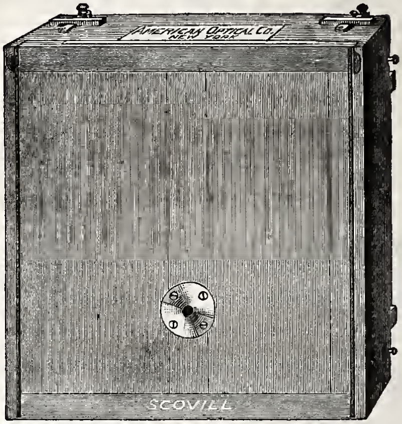
Each Album has 48 pages, 24 leaves. In them the finest card-board only is used, chemically free from anything that could injure a print.

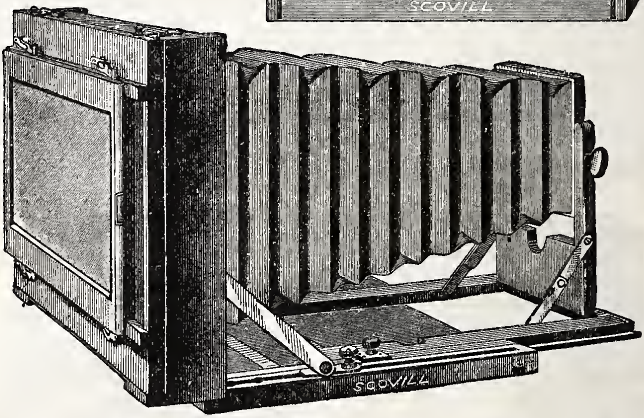
IRVING VIEW CAMERAS.

The IRVING Camera recently introduced by the American Optical Co. was awarded the highest prize by the judges at the American Institute Fair. They expressed themselves as unable to see how a more complete, compact, light, handsome and serviceable camera could be made.

The Irving Cameras all have swing front in addition to swing back, thus doing away with the necessity for vertical shifting arrangement to the front board. They have the Howe patent reversible back, fitted with self-locking ground-glass frame, and when desired, celluloid is used in place of glass for the focusing screen.

One of the best features of the camera is the absence of detachable screws. An idea of this is conveyed by the illustrations showing the camera when extended and when folded.





A superb canvas case, the finest ever made, is supplied with each one of the Irving Cameras. Price list is as follows:

	Single Swing.	Double Swing.
4 x 5	$27.00	$32.00
5 x 7	33.00	38.00
5 x 8	35.00	40.00
6½ x 8½	40.00	45.00
8 x 10	45.00	50 00

In order to convey an adequate idea of the lightness of these cameras, it is sufficient to say that the 5 x 8 size camera, with ground-glass in frame and holder, weighs only 3 lbs. Without holder, but with celluloid focusing screen, the weight is not more than 2 lbs.

Made by American Optical Co.

D. C. WASHBURN,

—DEALER IN—

Amateur and Professional Supplies.

A full line of Photographic Materials of all kinds constantly on hand. Orders by mail promptly and accurately filled.

D. C. WASHBURN,

$13\frac{1}{2}$ Bromfield St., Boston, Mass.

✦ Z. T. BENSON, ✦

DEALER IN

Amateur Photographic Supplies

✳ Lenses, Outfits, Accessories

OF EVERY DESCRIPTION.

No. 2334 THIRD AVE., bet. 126th and 127th Sts., NEW YORK.

Three-Crown Albumenized Paper

Used by FREDERICKS, ANDERSON, MORENO and LOPEZ, and the leading Photographers of this Country.

Trade Mark
DRESDEN ALBUMEN PAPER

Trade Mark
DRESDEN ALBUMEN PAPER

Trade Mark
DRESDEN ALBUMEN PAPER

UNDOUBTEDLY THE BEST ALBUMENIZED PAPER.

THE BEST WORKING. DOES NOT BLISTER.

THE ORIGINAL PENSÉ PAPER.

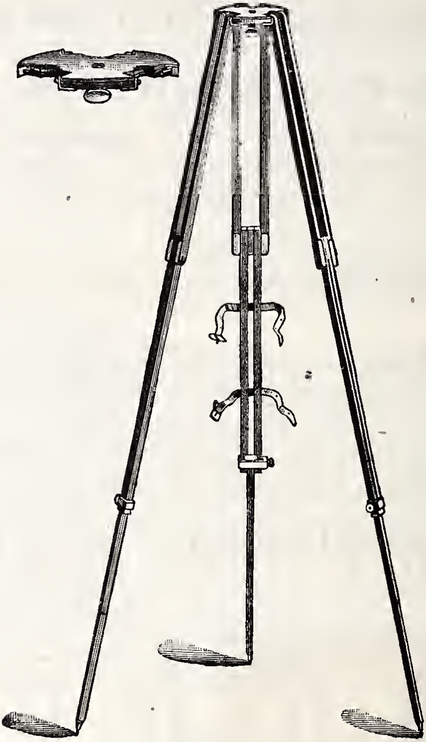
GIVE IT A TRIAL. FOR SALE BY ALL DEALERS.

THE ✦ SCOVILL ✦ & ✦ ADAMS ✦ COMPANY,

—IMPORTERS—

The Albion Tripod.

This is the most elegant Tripod ever introduced. It is adapted to and is firm enough to support without vibration any View Camera from 5 x 7 to 10 x 12 size, inclusive.



The Legs of this Tripod are adjustable as to length, and may be quickly folded. As the binding straps are attached, they are always in place when wanted.

The artistic design and faultless finish of every portion of this Tripod cannot be realized without seeing one, and to use an ALBION TRIPOD means to be fully satisfied, and wish for none other.

No. 1, price	$5 00
No. 2, Cherry wood	6 00
No. 3, Spruce (very light), price	6 00

BENSON, SMITH & CO.,

HONOLULU, HAWAIIAN ISLANDS,

WHOLESALE AND RETAIL DEALERS IN

Drugs, Chemicals and Photographic Supplies.

Representing the

THE SCOVILL & ADAMS CO. BLAIR CAMERA CO.
CARBUTT DRY PLATES. CRAMER DRY PLATES.

THE LARGEST PHOTO. SUPPLY HOUSE and PICTURE FRAME FACTORY IN WESTERN PENNSYLVANIA.

A COMPLETE LINE OF

Photographic Goods, Picture Frames and Mouldings

OF ALL KINDS CONSTANTLY ON HAND.

BEST GOODS AND LOWEST PRICES. Your Patronage solicited and satisfaction guaranteed.

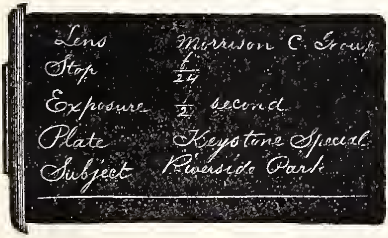
BROUDE MANUFACTURING COMPANY,

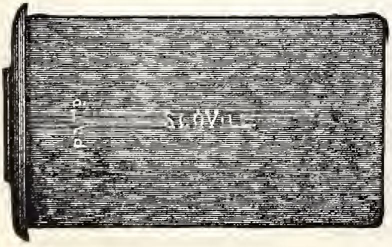
OFFICE AND WAREROOMS:

242, 244 & 246 FIFTH AVENUE, 21, 25 & 27 WATSON STREET,

Telephone, 1356. **PITTSBURGH, PA.**

REGISTERING SLIDES.





In the pleasure or excitement attendant upon picture-taking, holders and slides have been so changed about that the note-book afforded no clue to their identity. All photographers, whether professional or amateur, who have in time past puzzled their brains in the endeavor to solve such vexatious questions as these—

"Have I or have I not exposed that plate?"

"If exposed, was the plate used for that prized picture?"

"Shall I incur the risk of making a double exposure?"

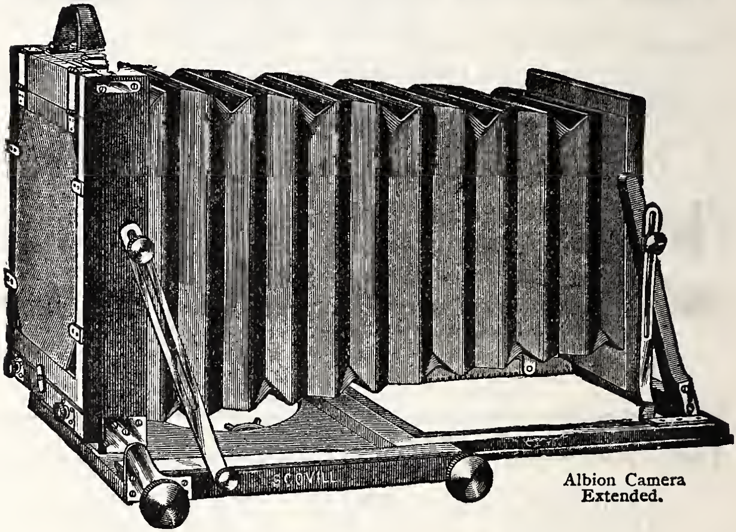
henceforth will have themselves only to find fault with if they do not procure and use in their dry-plate holders the patent registering slides, or as they have been called "Record Slides." These can be written upon with slate or lead pencil *ad libitum*, and the writing erased without injury to them.

Patent Registering Slides will be supplied with new American Optical Co. Dry Plate Cameras and Amateur Outfits up to 10x12 size without addition to price list.

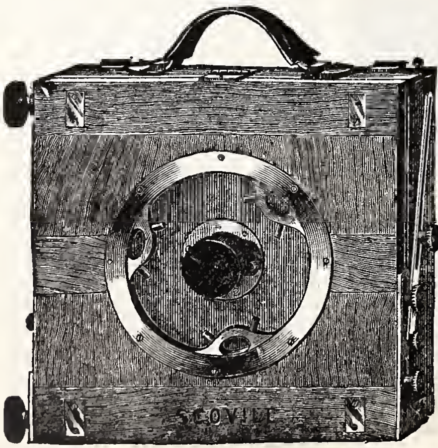
IF YOU WANT A COMPACT OUTFIT,

BUY AN

ALBION CAMERA.



Albion Camera
Extended.



Showing Turn-Table for Tripod.

PRICE LIST
OF
Albion Cameras.

Each with Albion Tripod and Extra Fine Canvas Carrying Case.

No.	Size.		With 1889 Model Roll Holder.
550.	4¼ x 6½,	$47 00	$61 50
551.	5 x 7,	48 00	62 50
552.	5 x 8,	49 00	63 50
553.	6½ x 8½,	50 00	68 00
552.	8 x10,	60 00	82 00

MANUFACTURED BY

THE SCOVILL & ADAMS COMPANY,

Send for Descriptive Circular.

JUST THINK OF IT!

AJAX

4 x 5	Rapid Rectilinear Lens	$9 60
5 x 8	Rapid Rectilinear Lens	11 20
$6\frac{1}{2}$ x $8\frac{1}{2}$	Rapid Rectilinear Lens	16 00
8 x10	Rapid Rectilinear Lens	19 20

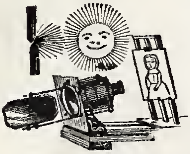
Send for Price List and descriptive circular.

BUCHANAN, BROMLEY & CO., Importers,

1226 Arch Street, Philadelphia.

SAMUEL W. BROWN. AUGUST L. RAU.

SAMUEL W. BROWN & CO.,



Platinum Enlargements

BY ELECTRIC AND SOLAR LIGHT.

Send for Price List.

915 Sansom Street, Philadelphia, Pa.

MENTION THIS BOOK.

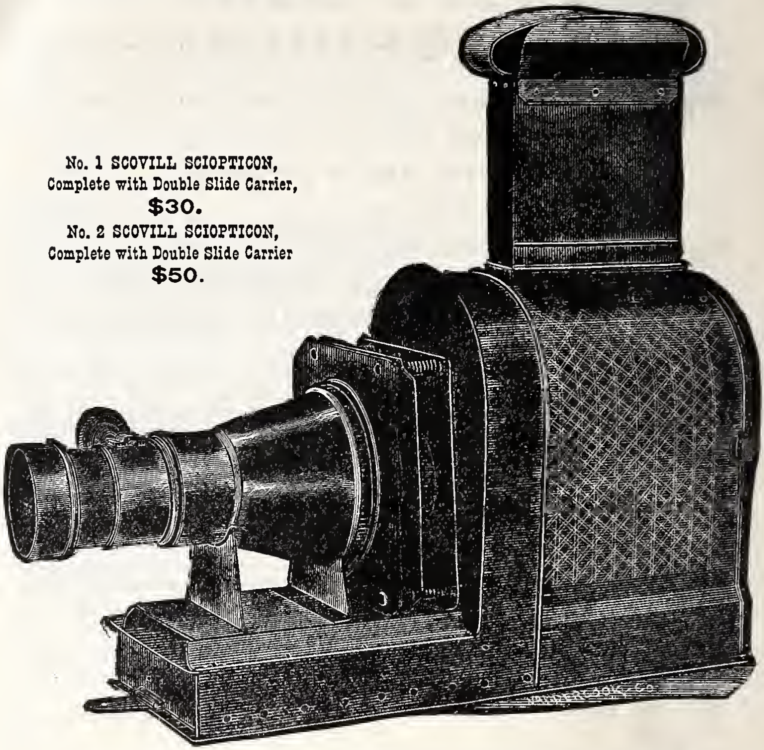
The SCOVILL PRINTING FRAME PADS.

FOR		1st Quality, GRAY.
$3\frac{1}{4}$ x $4\frac{1}{4}$	Frames, in boxes, per doz.	$0 24
4 x 5	" " "	33
$4\frac{1}{4}$ x $5\frac{1}{2}$	" " "	36
$4\frac{1}{4}$ x $6\frac{1}{2}$	" " "	38
5 x 7	" " "	54
5 x 8	" " "	57
$6\frac{1}{2}$ x $8\frac{1}{2}$	" " "	84
8 x 10	" " "	1 44
10 x 12	" " "	2 16
11 x 14	" " "	2 88
14 x 17	" " "	4 08
16 x 20	" " "	5 04
17 x 20	" " "	5 28
18 x 22	" " "	6 48
20 x 24	" " "	8 40

The above goods are very desirable, and the demand for them is increasing. They are put up in boxes containing one dozen pads each.

The Scovill and Adams Co.

THE SCOVILL SCIOPTICON.



No. 1 SCOVILL SCIOPTICON,
Complete with Double Slide Carrier,
$30.

No. 2 SCOVILL SCIOPTICON,
Complete with Double Slide Carrier
$50.

After experimenting with most of the lanterns in the market, we have come to the conclusion that for parlor or small hall exhibitions, chemical and optical experiments, etc., the Scovill Lantern affords, at a moderate price, the greatest number of advantages, and from its simplicity and non-liability to get out of order, gives, even in inexperienced hands, results superior to all others.

The No. 1 Scovill Sciopticon when packed for carrying, in its own Russia iron case, measures 15 x 10 x 6 inches, and weighs 12 pounds: the case serving as a convenient stand when the lantern is in use.

The Case and Body of the Lantern are of Russia iron, and neat and compact in form. That part of the body which surrounds the lamp is double, the outer cover being ornamentally perforated so as to allow a constant current of air to circulate and keep down the temperature.

The lamp is of the triple wick variety, and so constructed that the three flames combine, and by the draught of a ten-inch chimney give a brilliant flame.

The Condenser is four inches in diameter, neatly mounted in brass, thoroughly ventilated, and arranged with screw flange so that the lenses may be separated and cleaned when required.

The Cone, which carries the objective, and the mount of that lens are nickel-plated. The objective is a double achromatic lens of one and a half inch clear aperture and five-inch focus, so that at a distance of twelve feet from the screen, it gives a brilliant picture on disc six feet in diameter. The focus is roughly obtained by sliding the front, carrying both cone and lens; and fine adjustment by a rack and pinion on the objective.

The No. 2 Scovill Sciopticon measures, when packed in case for carrying, 18½x12x8½, and weighs 19 pounds. The objective is a double achromatic lens of 1½ inches clear aperture and 5½ inches focus so that at a distance of about 12 feet from the screen it shows a brilliant picture on disc eight feet in diameter. The lamp has five wicks and is correspondingly more powerful than the lamp with the No. 1 Sciopticon.

Scovill Prepared Solutions.

POWDERS AND CAPSULES.

S. P. C. Eikonogen Developer. Per package, $0 75

S. P. C. Pyro and Soda Developer.
Price, per package, ... 60

S. P. C. Hydrochinon Developer.
Does not stain the fingers or leave the plate yellow; works equally well with all brands of plates, giving perfect detail, density and brilliancy in the negative. Full directions enclosed in each package. Price, per package, . 60

S. P. C. Pyro and Potash Developer.
Price, per package, ... 60
Price, per pint set, ... 1 25
Price, per quart set, ... 2 25

S. P. C. Bromide Paper Developer for Eastman Bromide Paper. Set, ... 75

S. P. C. Restrainer. In accurate dropping bottle, 50

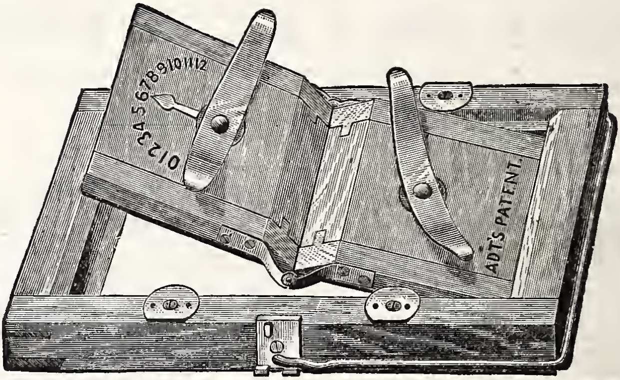
S. P. C. Developing Powders. Per box of 12, 50

Hydrochinon Capsules, ... per box, 60

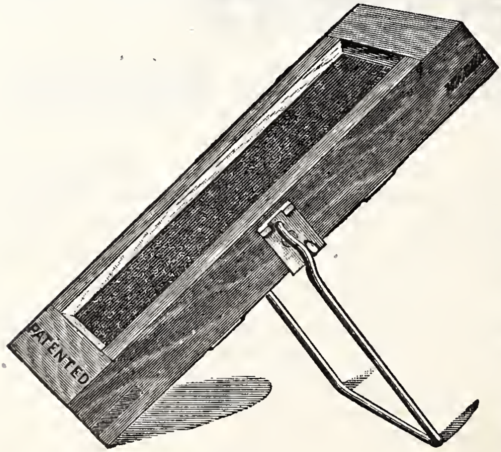
Negative by G. De Witt, Canastota, N. Y. M. Wolfe, Engraver, Dayton, Ohio.

FOREST SHADOWS.

ADT'S PATENT PRINTING FRAME.



These Frames are now supplied (without extra charge) with Adt's Patent Support with which the frame can be stood on either end, and at four different angles, for exposure while printing. It is out of the way of the printer when introducing the paper, or examining the print, for when the frame lies or is held with back up, the support instantly drops upon its stops for rest, and is entirely out of the way of the hand of the printer, so that he may remove or open the back-board, or replace it, as if there were no support present. Being arranged close around the sides and ends of the frame, it occupies so little space as not to interfere with the packing or storage of the frames, and when the printer places his frame for exposure the support readily finds its position for supporting the frame without any special manipulation.



PRICES.

3¼x 4¼	$0 50
4 x 5	50
4¼x 5½	50
4¼x 6½	60
5 x 7	65
5 x 8	65
6½x 8½	75
8 x10	85
10 x12	1 15
11 x14	2 15
13 x16	2 40
14 x17	2 80

When made with back to open lengthways, an additional charge of 10 per cent. will be added to the above prices.

As will be seen by a glance at the cut, the adjacent edges of the parts of the back-board are beveled outward, and the hinges placed on the sides with their axes on a line with the surface. This permits the attachment to the face of the back-board of a **Heavy, Continuous Elastic Felt Pad.** This obviates the necessity of using a separate pad, which is so easily misplaced and lost.

NEGATIVES.

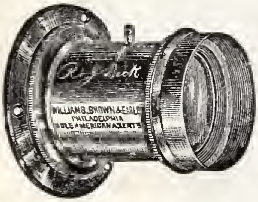
DEVELOPED, PRINTED AND MOUNTED.

We make a specialty of this work for the Amateur and our work is the very best.

Send us your undeveloped plates or film by express or mail.

Our Silver, Platinum toned prints can not be excelled in beauty or finish. We also carry a full line of Photographic Supplies, Cameras, Lenses, &c.

R. P. HARLEY & CO.
240 & 242 Wabash Avenue, Chicago, Ills.



THE BECK LENS

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THE SCOVILL

ECONOMIC LENSES.

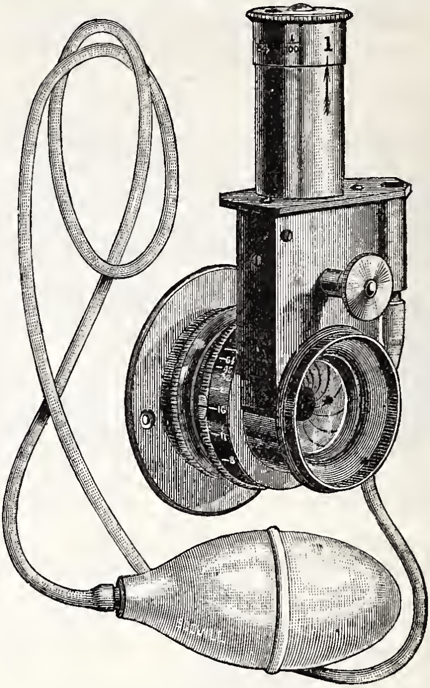
These Lenses are intended to fill the want experienced by thousands of successful workers with the Waterbury Lens, for a good, low-priced Rectilinear Wide-Angle Lens, whereby they can gain artistic effects in perspective at short distances.

The working qualities are much higher when compared with the finest lenses of this kind, than the low price indicates.

PRICE SCOVILL ECONOMIC LENSES.

No.	Size of Plate.	Back Focus.	Equivalent Focus.	Price.
3	$6\frac{1}{2}$ x $8\frac{1}{2}$	6 inches.	$6\frac{1}{2}$ inches.	$18 00
4	8 x 10	8 "	$8\frac{1}{2}$ "	22 00

THE INSTANTANÉ LENSES



The Instantané Lens is perfectly Rectilinear, and entirely free from astigmatism, even when used with its full aperture. It has the most remarkable depth of focus ever produced in any lens of the character.

The Instantané is one of the few lenses that are really Aplanatic. It is guaranteed not only to cover the size plate for which it is sold, but to do this without the least loss of definition on the edge of the plate.

It has a good field, although not so forced a capacity as some, resulting in a considerably larger image of the principal object than any other lens of its size would yield, besides absolute freedom from any distortion whatever.

The several lenses which form the combination of the Instantané are being ground from the newly invented glass which has found such prompt recognition in Europe. By reason of the crystaline purity and whiteness of this glass, the Instantané will be found to answer the most difficult requirements in *Speed*, and to work satisfactorily when others fail.

Having such a remarkably brilliant, yet soft illumination, this lens will be found vastly superior to all others of the Rectilinear class for Portraits. Used with the full opening, it takes a portrait of very superior quality.

The No. 1 size is with full aperture to cover a 4x5 plate, instantaneously.

		Equiv. Focus.		With Iris Diaphragm.
No. 1,	4 x 5 size.....	6 inches.........	$30 00	$35 00
No. 2,	5 x 8 "	8 "	35 00	40 00
No. 3,	6½x 8½ "	10 "	50 00	55 00
No. 4,	8 x10 "	12 "	60 00	65 00

No. 1, Instantané Lens, with Inst. Shutter and Iris Diaphragm, price $40.00.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Large bottle, ... 75

Reduces density in negatives and positives on glass or paper. Can be applied locally to remove halation marks, ghosts, etc.

S. P. C. Hypo Eliminator. (For Removing every trace of Hyposulphite of Soda from Negatives and Prints). Price, per bottle, with book of testing paper, ... 50

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French Azotate (For Toning Prints.) " " 25

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Produces the most brilliant tones, ranging from chocolate to black on ready-sensitized paper.

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By which any plate may be rendered color-sensitive. Price, per package, ... 1 50

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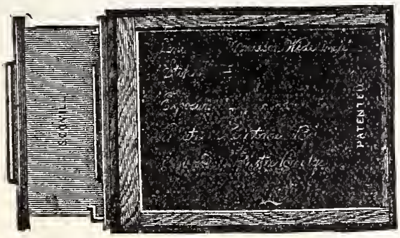
Light-Weight HOLDERS.

Substantial, serviceable and accurate double holders cannot be made smaller or lighter than the Scovill Light-weight Holders, and though so thin kits may be used in them. They yield a negative *the full width of the plate*, and, what is equally important, the plate may be placed in these holders or removed therefrom *without touching the sensitive surface* and *without danger of breaking it*. Observe the means shown in illustration for locking the slides. They are made with solid frame so that they *will not come apart, leak light, or warp*, and all have the *patent Registering Slides.*

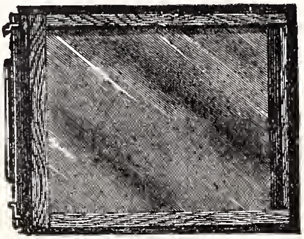
Price Light-weight Double Holder.

3¼x4¼	$1 10
4 x5	1 25
4¼x5½	1 25
4¼x6½	1 25
4¾x6½	1 30
5 x7	1 30
5½x7	1 40
5 x8	1 40
6½x8½	1 70
8 x10	2 00
10 x12	3 50
11 x14	5 00

Patented Nov. 15, 1887, and Jan. 24, 1888.



Showing Patent Registering Slide.



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Printed on Japanese paper, mounted on boards. Size, 11 x 14, tied with silk cord in a specially designed cover and put up in a neat paper box.

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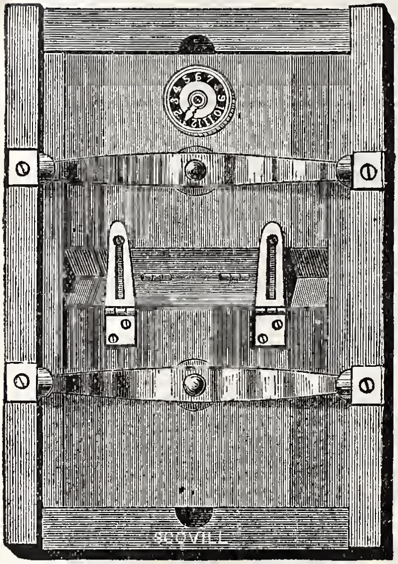
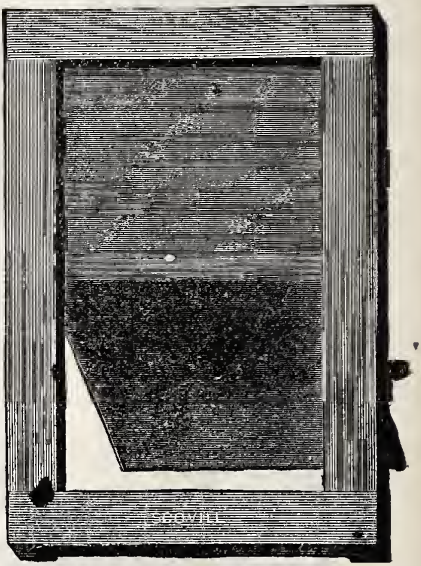
WITH ADJUSTABLE SUPPORTS.

(PATENTED.)



IRVING PRINTING FRAME, CLOSED

FRONT VIEW.



IRVING PRINTING FRAME, OPEN.

BACK VIEW.

The IRVING FRAMES have valuable features which cannot be copied. They are in workmanship, design, and other respects, superior to all other printing frames.

The continuous felt pads made especially to order for us, insure absolute protection and uniform pressure throughout. The Irving Patent Catches lock the back, so that when one flap is open there is not the slightest danger of the flaps, paper or negative slipping.

The springs are cut by dies of specially tempered and tested metal, and are riveted to the backs with washers underneath to protect the woodwork.

The IRVING FRAMES are made of cherry guaranteed not to warp or crack.

The tally does not depend upon any other part of the frame to lock it, for the pointer will remain in place no matter what is done to other parts of the frame.

Prices for Half or Two-thirds Opening Styles.

3¼ x 4¼	$ .45	5 x 7	$.60
4 x 5	.48	5 x 8	.65
4¼ x 5½	.50	6½ x 8½	.70
4¼ x 6½	.55	8 x 10	.80

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